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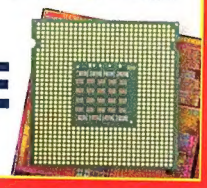

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Changing gear

Atomic has always represented the epitome of hardware excellence, it reigns supreme among its kind like the ever present icing on the cake of technology. It's written by and for a community which loves to play, and for whom the journey is as important as the destination – building PCs, optimising, case modding, and overclocking are our lifeblood, savoured like a tasty sauce while they are practiced, and not just for the juicy, refreshing, creative fruits they result in.

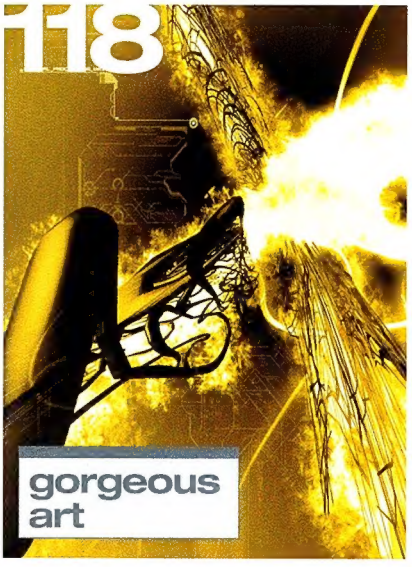
Some people paint cars, I build beastly boxes of speed. It gives me a kick. I've built more machines than there are episodes of Neighbours. It's not that I *need* to upgrade so frequently, it's that I just love playing with the latest kit, pushing its limits, and feeling pride for a level of performance squeezed out of otherwise mainstream hardware.

Occasionally, I might actually have a need to harness the power of the machine I've created – a demanding game, or the latest kernel compile (I'm one of those addicts who knows the intimacies of ***patch -p1*** well.)

But whether it's time to upgrade just a single part or lay the foundations for a new monkey-munching ninja box of death, it's key to know the state and performance of currently available gear – and so, this month, our cover feature is just that. We locked *Bennett Ring* in our labs for a week, and aside from smelling funny he created this work of art. It's the sweet nectar of wisdom, in that benchmarked to oblivion kinda way.

Something else is undergoing an upgrade this month as well. Something important, and wonderfully sexy. By the time you read this, a hot new version of *Atomic's* website (**www.atomicmpc.com.au**) will be up and running – the rather spankworthy *Version 2.5*! Featuring new online-specific content, a new look and feel, updated archives, and sections exclusive to Green Club members (this means *you*, if you're holding *Atomic* in your hands!) Find out more on *page 8*, and join in on the fun. See you online!

Ashton Mills
amills@atomicmpc.com.au



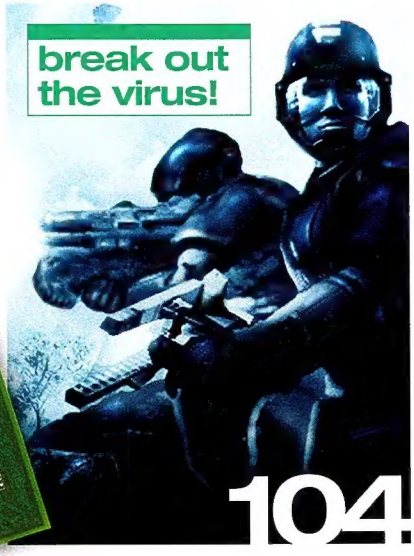
this month

FEATURE

We have the technology to make it faster and stronger, so why is your PC still slow and weak? **Bennett Ring** tells you everything you need to know to upgrade you rig.

HARDCORE

TECHNIQUE



GAMEPLAY

REGULAR

onthecd The silver disc of app magic

Multimedia magic

Whether you want to create, watch or listen to media, one thing is certain – a default Windows install isn't very well equipped. Just about all you can do is listen to MP3s and watch MPG files. What about OGG? FLAC? XviD? How about some subtitles to go with that? Multi-track audio editors, powerful video editors, post-processing tools, organisation tools, video and audio encoders – it's all conspicuously absent.

Which is why we've compiled this spanking new bit of kit, to set you right after a fresh install. Within you'll find all you need to play, and in some cases encode to, the most popular media formats on the Web today.

In fact, it's entirely possible you could build your own movie using just the tools on this CD – record and manage your audio in Audacity and Kristal Audio Engine, edit your video in VirtualDub, add subtitles to it in Subtitle Workshop, post process it in AviSynth and then finally encode to your favourite format. Too easy!

See, who loves you more than *Atomic*?

what's inside

Game Demos
Psychonauts

Audio
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Subtitle Workshop 2.51
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atomic53 ...what is your favourite 'Red Dwarf' quote?

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editor ashton mills "I'll be in my room, coated in honey"
senior writer logan booker "stoke me a clipper, ill be back for christmas"
staff writer nathan davis "spin my nipple-nuts and send me to alaska!"
senior sub editor melanie farr "life's a bitch, now smeg off, i'm busy"
online producer ben mansill "you're a complete and total smeghead"
editorial consultant debra taylor "Don't give me this Star Trek crap, it's too early in the morning."

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designer marissa mcgarry "It's my duty, as a total and utter bastard"
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WHAT'S NEW

Wouldn't it be wonderful if you could whack the Refresh button on your browser and, through the magic of the internet and various satanic cults, be presented with a tasty new redesign of the site you were at?

Well, technology hasn't quite come that far yet, and all the cults we consulted were busy plotting the end of the world, or coconuts, or some other hard-shelled fruit. So, we made do with a crack team of web developers and an antique voodoo charm of walnuts instead.

The end result? Atomic V2.5. And, like mum, she is a thing of beauty. So, what makes Atomic V2.5 the best thing since shelled food?

Firstly, there are five new forums: System and Peripherals; Portable Tech; Windows OS; Security and Graphics and Design. We've also enhanced and tweaked the private messaging service and the forum search function, whacked in an RSS feed, given the community its own, special area in the navigation area and created a facility for entering competitions online.

If this wasn't enough, we're also going to make available to both subscribers and newsstand buyers select product and game reviews online – often before they make it to print. So you'll have access to some of the best, high-quality, awesomely witty content from the magazine on the website.

Could it get any better?

Of course it can! We've overhauled the visual look of the site to make it as fantastic as it can be, and to bring it more into line with the style and format of the magazine. Harmonious and splendiferous, just like mum.

After making all these great changes and additions, it seemed wrong to stop. So, if you're reading this magazine, then you have immediate access to exclusive content, including mag stuff, Trademart and the extra special Green Room. All you need to do is enter the special code on the back of the CD cover to get access.

Some say we're crazy, others think we're cool. Well, we're a bit of both actually, mostly the cool though.

We've been busy implementing all this stuff over the last few months because we know you love the site as much as we do, and we want to see it shine. Kisses and hugs, let the good times start.

Right now, there's a load of content to check out, and we'll be updating it on a super regular basis. Every time you visit the site, chances are they'll be something fresh to read or see. If that doesn't excite you, nothing will.

So don't wait. The new stuff is online right now, this very second. Go get it at **www.atomicmpc.com.au**.

Sword for hire

Sony says virtual auctions are 'grouse'.

fuzzylogic

Ben Mansill's view on the crazy world of tech and ente[illegible]ie

A boy and his games

Games and computers have always been symbiotically linked with each other, and me and my life. Marching hand in hand up the staircase of inevitable advancement, games and hardware each pushes the other to new heights and tows me along with them. I love that. I love so much that the whole world of it all is the biggest thing in my life. I love that I was lucky enough to be there through the emergence of games and PC technology.

I love the perspective it allows me, having been grabbed by the balls by gaming when it was a mere cottage industry of idealistic hobbyists.

Gaming was originally the dirty unwanted stepchild of PCland. It wasn't sexy and glamorous and MTV, like it is now, and I'm glad for that. Even if I didn't appreciate it at the time.

Within my bunch of friends, growing out of my teens and through my 20s, I was the only one into games. Sometimes I felt like it was my shameful secret, sometimes I worried that I was becoming obsessive. Every Thursday night I'd be down at Gamespot in town, marvelling at the Thrustmaster gear and scoping out the week's latest MicroProse game.

Once a year or so, I'd upgrade to a new CPU and the newest Tseng Labs ET4000. I made sure I still went out and did normal-person stuff, but more than a few times I'd skip a Saturday night party to stay in and game.

I didn't even own a PC until I was 25. My teen gaming were lunchtime and after work sessions, playing on the EGA 286/16 at the office of an otherwise lifeless company. I really really needed to sort myself out and get equipped at home. Borrowing an office laptop each weekend (orange plasma screen Tosh, weighing a frucken tonne) was a stepping-stone between fully embracing what would be my life, and a last half-hearted effort at denial.

Then I bought an Amiga 500 and that was that.

Being a fantasyland escapist, my taste in gaming was – and still is – either sims or strategy. On the office PC it was mostly GPEGA, the 10kg orange Tosh was an Accolade Mean 18 machine, and the Amiga was F/A 18 Interceptor, Carrier Command and Conflict Europe. Oh those blissy days.

Then one day I arrived at my shitty menial office job and everybody was all sad. It was retrenchment day. Half the company was getting the chop – me included, as I found out minutes later. No sad face for me! With the biggest cheque I'd ever seen in hand I went straight to the PC clone shop, bought a 386DX/25 with a full meg of RAM, loaded it with Falcon 3.0, Harpoon and Civilization, and spent the next year in my computer room until the money ran out.

A few years and a thousand hours of MOO2 later, somehow I've managed to combine a passable real-life life with my tech and games addiction. It can be done! Get into it, kids of today, if you love something, embrace it without a damn.

shortcircuits

Adobe Acrobat Flash

Adobe recently bought Macromedia for the insane sum of US$3.4 billion. Seriously, the world just gets crazier by the day. Macromedia is best known for its Flash and Shockwave products, used to create animations that, along with CompuServe's GIF format, is one of the most prolific (and more than likely annoying) forms of multimedia on the internet. We can't wait for the Photoshop Flash ads to hit websites everywhere.

GameStop > EB Games

Staying on the topic of companies eating other companies for breakfast, retailer GameStop and Electronic Boutique are soon to be one and the same. The new business, called GameStop Corp, will have the lion's share of the game retailing business – in the States at least. Although at the time of writing the deal wasn't 100 percent solidified, both companies appear happy with the agreement and it is unlikely that it will fall through.

PlayStation Pornable

It's been available barely a few months and already there are hacks galore out there for the PlayStation Portable. If this wasn't terrific enough, Playboy has plans to release galleries specially designed for the handheld console. That's right, porn on your PSP. Both nude and non-nude photos will be accessible, so we guess it comes down to how well you can play one-handed.

ground zero

Behind the lens

Today's digital imaging often relies on the same basic physics as did older, slower, more-likely-to-involve-trays-of-sodium-thiosulfate-solution technologies. Take, for instance, 3-CCD video cameras.

Amateur and semi-pro videographers have been lusting after cameras with three sensors in them since Hi8 tape was the hot new technology, and with good reason. 3-CCD cams use a beam splitter that delivers red, green and blue light to three separate sensors. The result is a higher resolution and better colour rendition.

People have been taking colour photographs since Sergei Mikhailovich Prokudin-Gorskii (ask for him by name, accept no substitutes) did triple-filter shots of Russia about a hundred years ago. Anything that moved between the filtered exposures would end up a psychedelic blur, and he couldn't make prints, but he could *project* some pretty cool pictures.

We had to wait a lot longer for movies using 3-CCD-ish technology, of course.

That took until about 1933. That was when 'three-strip' Technicolor first hit the screen.

Technicolor used a beam splitter, not entirely unlike that inside a 3-CCD camcorder, to deliver R, G and B to three separate strips of film. Those strips were laboriously exposed and combined and dyed and applied to a final clear (or, sometimes, black and white) film strip to create a multicoloured single final strip that a normal unfiltered single-lens projector could display.

This was difficult and expensive, of course, and lining up the colours was a bit of a bugger. There are the thick end of two million Technicolor frames in Gone With The Wind. Any volunteers?

Now, your modern handy-cam is just a tad superior to the common home movie formats of days past. Grandpa's 8mm

Core to arms

Moore's Law floored by dual-core.

Well, it has begun. After much talk of AMD and Intel shipping dual-core processors, the first parts to feature twin cores are already on the market. The first of these will be available in systems from Dell and Alienware and will be powered by Intel's Pentium D Extreme Edition – the first ever dual-core processor accessible to consumers.

Although competitively priced, a dual-core processor is still going to set you back a bit. The dual-2.8GHz retails around US$250, while the fastest model, the 3.2GHz, will cost you US$530. These prices aren't *so* bad, considering you're getting two processors on the one chip, and are close to the costing of their single core cousins.

The major hurdle currently for dual-core CPUs is performance. Although there's no doubt a dual-core processor decimates single-core parts when it comes to multi-threaded applications, there are few such programs available. Many, oddly enough, are in the form of benchmarks and, apart from Quake-based titles like Call of Duty, there's no extra speed to be gained on the gaming front. For the same price of a dual-core processor, you could pick yourself up a speedy single-core CPU.

Intel however predicts that by 2006, dual-core parts will be everywhere, thanks to price cuts and proliferation.

AMD also has its dual-cored Opteron ready to hit the streets. Pricing for these processors will be steeper than their Extreme Edition counterparts, but this is because they're for the server market. The prices themselves will be in line with similar single-core Opterons.

The manufacturer plans to have a dual-core Athlon 64 available in the near future.

Infinium for life

Who knows what's going on with Infinium Labs these days – or that Phantom thing it keeps going on about. Regardless of what you may have heard, ex-Xbox guru Kevin Bachus is still with the company and has no plans of leaving anytime soon. According to sources, he and the 'amazing team' at Infinium are certain they'll have Phantom out the door, along with its prophesied streaming game service, by the end of the year. Considering this has been promised time and again for the last few years, it's hard to believe it'll come up with the goods this time round. It's interesting to note that the company's VP recently resigned. Scary stuff.

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movies had no sound, VHS resolution at best, 16 frames per second, and a filming time per spool of less than four minutes.

But that doesn't mean that recognising the importance of the old tech, and even letting some of its look leak into modern life, is a bad thing.

Back in the 1920s, there was 'two-strip' Technicolor, which only captured red and green. There was no actual blue at all in a two-strip movie, though viewers often thought they saw some, as their brains struggled to deal with all those brown skies.

Sky Captain and the World of Tomorrow looks somewhat like a two-strip Technicolor movie. The makers used Adobe After Effects plug-ins to create that effect, plus the soft focus that emulates old simple movie camera lenses. Why'd the do it? Because it looks cool, that's why.

Today, some people are using their expensive digital SLRs as pinhole cameras. Make a tiny hole in small thin piece of metal, then affix metal over hole cut in middle of camera body cap. It's sixteenth century technology.

You can do soft-focus simple-lens photography with DSLRs, too. Wangle up some tape-and-rubber monstrosity with a bored-out body cap on one end and a plastic magnifying glass lens on the other. Or cheat, by dropping enough money to buy a modern lens on a Lensbaby (**www.lensbabies.com**).

It is, of course, fun and educational to muck about with this sort of thing, but there's more. You can't take pictures that look like pinhole exposures without a pinhole, and pinhole photos can look *great*. And you can fake soft focus and weird tilt-shift stuff, Lensbaby style, by playing around with it in Photoshop, but you can't stand there in front of a flower and play in real time without the actual hardware.

We've already got software emulation of rooms full of expensive old music equipment; maybe photography will go the same way.

In the meantime, though – get out your body caps (**tinyurl.com/4lzeu**), and start pinholing!

futureproof

Quenching your thirst for the latest technology and hardware

Ultra-surfing brains

Nathan Davis fires sonic beams into his head and screams 'What's Kung Fu?'

Having the ability to walk around in vivid virtual worlds is something often fantasised about. In theory one can do whatever they wish with no repercussions via reality's cruel physical restrictions. Like fly to the Moon by leaping from a tall building and flapping your hands twice.

With Microsoft not long having patented the conductivity and potential data-transference properties of the human body, it comes as no surprise that more biotechnology patents have surfaced. Sony has been granted two separate patents on the matter of virtual reality.

Interestingly, both patents (6,729,337 and 6,536,440) are not about an immediately realisable invention, but a theory. This theory describes a system that can generate sensory information and output it directly onto the human neural cortex. It describes aiming data at specific areas of the brain in order to successfully achieve the virtual experience via neurological sensory stimulation.

One might imagine new orifices as seen in *The Matrix*. In a slightly less invasive process, it's envisioned to be more like Total Immersion as seen on *Red Dwarf*. And possibly like the creepy dolphin robot on *Johnny Mnemonic*.

Rather than a physical connection to the brain, ultrasounds will be used. With a machine pulsing ultrasounds into the appropriate sections of our brain, they can excite the correct neurons and ignite the senses – and potentially all the senses, whether sight, touch, sound, smell or taste. Given the option, some worlds might be best with severely truncated senses.

This machine would not only be great news for those of us with fully functioning bodies, but also the restricted. In theory, at least, this would finally create a foundation for worlds in which anyone can do anything.

That said, what couldn't it do? Well this is no means to storing data in your brain, so you can forget about being a human data courier. It also can't make you learn things instantly, such as Jujitsu or Wet Towel. You could still learn things, but in a simulated environment with similar resources to what we all use in the real world. Though, if we can understand how to input sensory information, no doubt a new education system is just around the corner. But that's probably *several* years off.

As this has not been done before, it is unknown exactly how the overall experience would turn out inside our heads. Would our brains be completely taken over and have a specific virtual world displayed in our head, or will it rely on our imagination, with certain specific pulses coaxing our minds into imagining thoughts we already partially encompass? Regardless, such a system is also potentially damaging and would require safety nets.

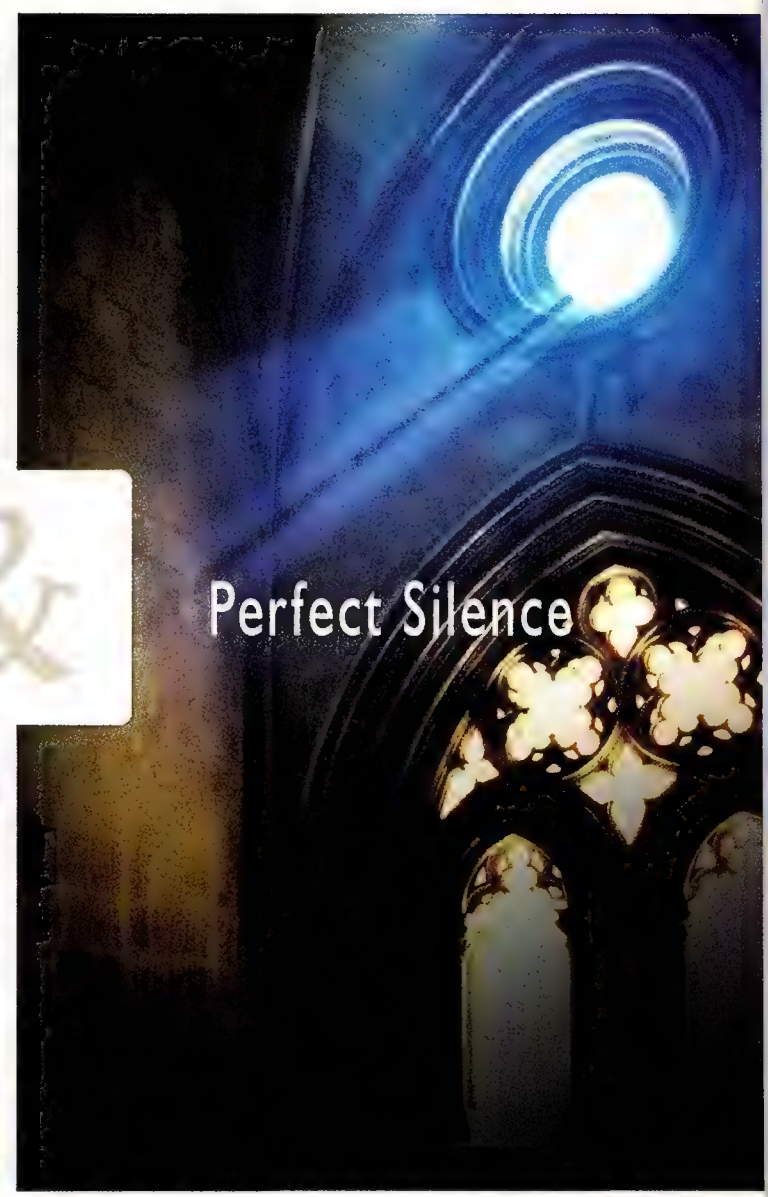
One main issue is what data can be used and how it should be formatted. Meddling with the contents of our mind isn't an exact science and we're far from it. What this means is Sony's 20-year patent will be long gone before any significant progress is made.

Of course, we all secretly know we'll be permanently tuned in to these devices and our household appliances will rule the real world. But we don't care. All we want is Dead or Alive: Ultrasound Edition. Ooh yeah.

Pure Power

&

Perfect Silence



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- Plentiful expandability: 11 drive bays and 7 PCI slots

Nouveau Series

- Brilliant look and design
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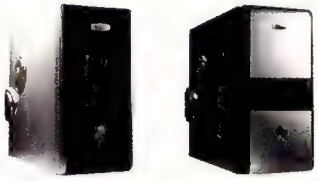
- Plentiful expandability: 11 drive bays and 7 PCI slots



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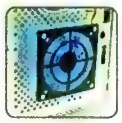
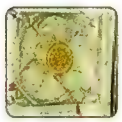
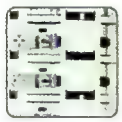


90mm Front blue LED fan (Impression & Nouveau)



120mm Rear silent fan

Screwless PCI slots



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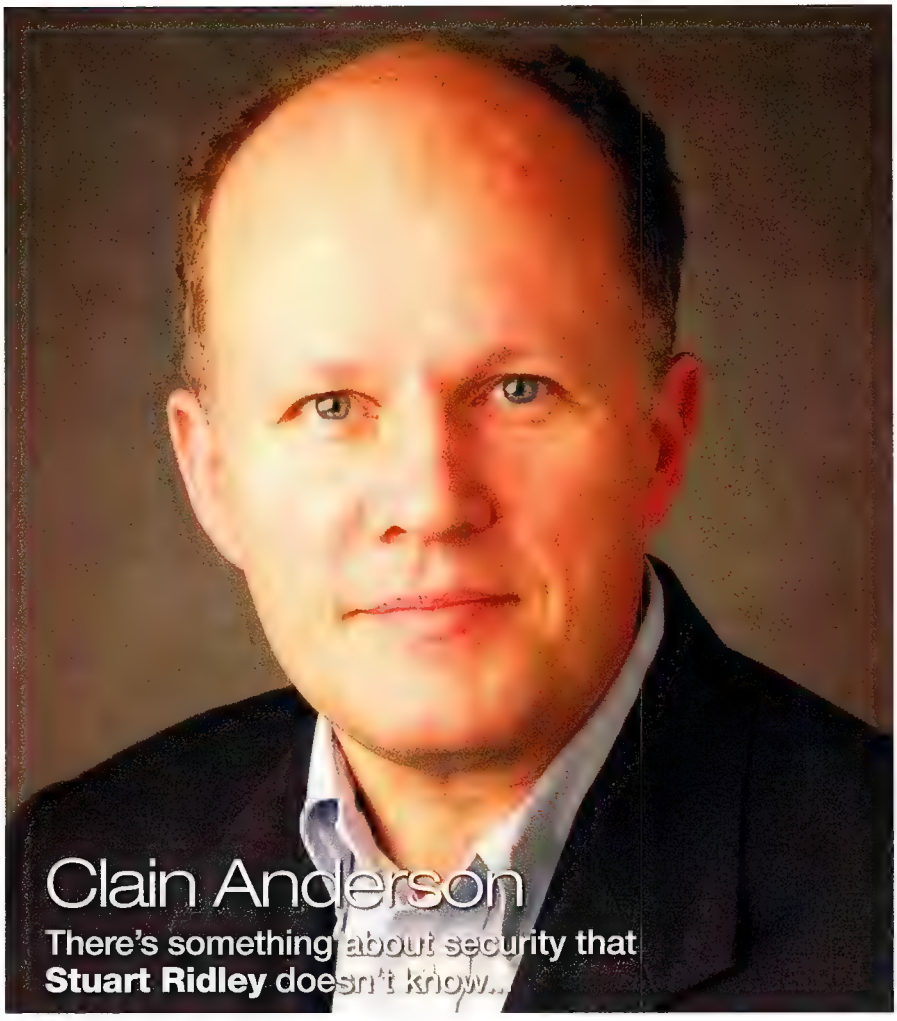

Clain Anderson

There's something about security that **Stuart Ridley** doesn't know...

While many of us want more power out of our take-anywhere devices, Levono Group's (formerly IBM's PC Division) Clain Anderson is more concerned about making them more secure. We decided to get the low down with Clain, a geek turned program director, and Levono's new super-secure ThinkPad x41.

Atomic: It's not every day we meet a marketing guy who's also a bona fide geek. Were you like many of our readers – did you pull apart and modify computers from an early age?
Clain Anderson: I'm old enough that when I was a child there were only room-sized computers. The first computer I ever used regularly was a Burroughs mainframe in 1971 and the first minicomputer I ever used was a DEC PDP-11.

As a child I subscribed to the American Basic Science Kit series, which mailed a bag of parts to me each month with plans for building oscillators, amplifiers, radios, photo-flash units, etc. I built everything on their list.

I got my amateur radio licence at age 13 and was active on the air. In high school I built a couple of Heathkit amateur radios and built a Heathkit colour TV in college. The first home PC I owned (if you can call it that) was a Radio Shack TRS-80 – and I did have to look inside to see how it was built.

I've built many PCs over the years – at one point, we had ten PCs running in our home including a dual-processor server with a RAID array and a dual-processor graphics workstation.

Atomic: Levono is promoting its new ThinkPad x41 as 'the most secure mobile in the world'... what makes it so, and what are some of the lesser-promoted threats to data integrity that could catch us unaware?
Clain Anderson: [There are] many layers of security capabilities in our ThinkPads, including the ability to use your fingerprint for pre-boot authentication, and ways to use [the] Trusted Platform Module (TPM) to protect wireless credentials.

Our built-in Rescue and Recovery utility lets you take multi-generational snapshots of your entire hard drive. In the event of a crash you can restore every bit to its original place, and any files touched since last backup are presented to you for individual recovery. This works even if Windows has been corrupted and will not boot.

Atomic: What was your personal input into the development of embedded security in new ThinkPad systems?
Clain Anderson: My team and I do face-to-face briefings with a large number of customers every year, and we've learned to listen to find out what PC users want. The features we've developed for security, migration, and wireless have been a direct reflection of the questions that our customers ask. While I may not get to do the tinkering and building myself anymore, it appeals tremendously to my inner geek to see new solution ideas I've requested become a reality in our products.

Atomic: Is the integrated security chip in the ThinkVantage system a form of the hotly-debated 'Fritz' chip? If it's a different system, how does it differ from Fritz and Palladium?
Clain Anderson: It's vastly different. The term 'Fritz chip' to my knowledge was coined by Professor Ross Anderson (no, we're certainly not related) to attribute a variety of functions to the TPM that aren't supported or possible, and to suggest functions of the chip that he thought could be used in nefarious ways.

[These] included claims that you would not be able to run unlicensed software on your PC or that a software vendor could disable some function on your PC by remote control. Fritz Hollings was not re-elected to the US Senate in 2004. The TPM was designed before Senator Hollings ever thought about protecting content from the PC user.

A more factual picture of the TPM capability

atomicbio

Name **Clain Anderson**
Occupation **Program Director, Security & Wireless, Levono Group**

Clain Anderson's IT career spans three decades and some of the biggest names in computing. However, it was the career-switch to marketing while working at HP that saw him really make a name for himself. As a product manager for HP calculators he launched the world's first symbolic math calculator, which led to a promotion to the role of World Wide Marketing Manager for the group, and later supported his evangelism for wireless, through HP Palmtop and notebook PCs.

During the mid-90s Clain scored a product marketing manager gig at Digital Equipment that saw him launch the Digital HiNote mobile line. When Compaq took over Digital, he stayed on for 7 months to complete the handover, then moved onto Levono where he continues to focus on the Embedded Security Subsystem and launch of the first notebooks offering fingerprint biometrics.

would be to think of it as an advanced cryptographic smart card attached to your PC. A smart card doesn't monitor my software usage, it doesn't report back to some remote person what I am doing or not doing, and it doesn't control my actions as the PC owner.

If I program or configure the smart card myself, I am the only one that has control over the card and my PC, and no third parties are involved. I can use it to hold private credentials, respond to authentication requests or supply keys when asked. This is exactly how the TPM operates.

I could conceivably use a TPM to protect a 'white list' of applications that I know are good, and to prevent viruses or worms from altering or damaging those applications. As a trusted blocker of viruses, there could be real value to any PC owner. There are open source TPM drivers available and at Levono, we've constructed a demo to show real time system integrity verification in Linux, a function that I suspect many users would be glad to have. Exploitation of this in Linux is waiting for some dedicated open source developers.

Palladium was renamed Next Generation Secure Computing Base and then moved out of the Longhorn operating system to some time in the future. Longhorn will use the 1.2 version of the TPM to provide better protection of the Windows password. Longhorn will not use the TPM for anything more than that. Microsoft would be better able to comment on its plans beyond 2005.

Atomic: In your opinion, which is the greater threat to our IP (intellectual property/ 'owned ideas') – theft or data corruption? And what should we be doing about it?

Clain Anderson: I think notebook theft is the biggest threat to every mobile PC and the owners' data and we're trying to help address this threat. We are shipping a lot of built-in fingerprint readers. We supply a sturdy built-in HDD password capability, free TPM software which includes file and folder encryption plus password/certificate protection, and a password manager which protects passwords with the TPM and can easily be tied to the fingerprint reader for solid two-factor authentication. I believe our progress on theft recovery puts us ahead of all of our competition.

Atomic: Your recent work on Trusted Computing includes some focus on making new generation machines very strong in terms of security and very strict in terms of DRM. Which is the bigger issue?

Clain Anderson: I don't believe the Trusted Computing Group (TCG) standards are worth much for DRM applications. The fundamental TCG assumption is that if I own the PC, I should have control over its capability and security. If I'm trying to protect content from the PC owner, TCG is probably the wrong approach.

Content owners need to work out plans for proper authorisation of their customers, but those plans will probably centre more around operating systems than on TCG architecture.

I am very concerned about protecting PCs from outside intruders, who are either coming in over the network or have stolen the PC. The Trusted Platform Module gives me a basis for trusting my PC. It provides no back doors for outsiders, pretty hard protection against dictionary attacks, and prevents my digital keys from being stolen or someone cloning one of my certificates.

I like it and I use it every day. I have all of my passwords and logon credentials banked through my TPM and tied to my fingerprint. I'm able to use long, hard-to-guess passwords that I would never type in by hand. It's easy and secure, and nobody has control over my TPM except me.

Atomic: Recent data protection schemes aimed at preventing unauthorised use of copyright material have drawn criticism for being far too restrictive (eg. music CDs unplayable in some systems; loading of super-strength monitor/spy/control software as part of a legal installation, which then compromises system performance...). Why would anyone want to put up that? How do you spin this for the end-user?

Clain Anderson: I believe in the legal use of software and material on any system and don't support copyright violation. However, usability needs to be considered. I don't think consumers or businesses will put up with significant problems created to protect content. Personally, I won't buy or own a system that has a back door controlled by an outside party.

Atomic: Wireless security is becoming an increasingly hot topic as wireless devices become household items. What sort of threats could we face in the future with the protection of data and services, and how do you see – given current systems appear easily crackable – wireless security being implemented in the future?

Clain Anderson: People should take reasonable precautions to protect wireless access – we suggest EAP-FAST or a WPA2-compliant system.

Any business should combine one of these protocols with a VPN to give acceptable protection of data being sent and received via wireless, even if they think they're safe in their own building and behind the firewall. This combination should provide an acceptable level of security for most businesses. Individuals should utilise as many of these solutions elements as they can manage.

> **"I don't think consumers will put up with significant problems created to protect content. I won't buy or own a system that has a back door controlled by an outside party."**

Atomic: What's the most fascinating or bizarre form of security break-in you've seen or heard?

Clain Anderson: I'm not much for fascinating or bizarre, but I see a lot of irony in the University of California theft [in April] of a couple of note books. The University planned to implement data encryption on the machines later that same day, but didn't get the chance!


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X-ray

Looking at tech from the inside

MD5 integrity checking

How do you ensure that the files you download are the genuine, unmodified, article? Easy, with a little help from the magic of hash functions.

So how do you verify the integrity of files – and in fact, any information – you receive is the same as the author intended, if you don't have a copy with which to compare? This is a problem Professor Ronald L. Rivest of MIT sought to solve when he developed MD5 as a means to digitally 'fingeprint' data, creating the possibility to compare just fingerprints rather than the data byte for byte. MD5 is much more reliable than checksumming and similar methods of integrity checking, and is used extensively by both commercial and open source developers for the distribution and integrity checking of many software products.

howitworks

The MD5 algorithm is actually a hash function. Hash functions take as input a message or data of arbitary length – anything from a small string through to gigabytes of data and more – but always produce an output of fixed length (for MD5, a 128-bit number) for any given function. You can, in fact, create an MD5 sum for the entire contents of your hard drive if you wanted to or, conversely, nothing at all.

Additionally, the result is almost guaranteed to be unique. Ergo, you can 'fingerprint' a file or data of any size on the source end, fingerprint the same data on the receiving end, and compare fingerprints to see if the files are identical.

Any tampering or damage along the way in the source file while it was transmitted will produce a different fingerprint.

completelyunique?

MD5 and hash functions come under the field of cryptography, and it currently stands that no cryptographic algorithm is perfect. It is not possible to prove that two different files could never have the same MD5 fingerprint result, but the odds are so great it's close enough to be considered as such.

makingyourown

Sometimes you'll be able to download files that will have MD5 sums made for them – this is especially true of open source software. To check your files downloaded completely (and with integrity) you can create your own MD5 sums from the source files.

Linux users will more than likely have a program called 'md5sum' already installed with their distribution. For Windows, grab 'hkSFV' from **www.big-o-software.com/products/hksfv** or 'md5deep' from **md5deep.sourceforge.net**, both of which are free to download and use.

Example MD5 sums

Zero length file

```
d41d8cd98f00b204e9800998ecf8427e
```

Issue_50.djvu (Issue 50 DjVu file)

```
32b1fec0a7b1642bf798da1131be6bf7
```

x-ray-53.txt (this page in raw text)

```
beb44492cc8ae900536b7ba3298b338ea
```

Try it yourself. Type the following phrase (with quotes) into a text file and save it (no trailing returns): "Yes Sir, very Atomic!" You should get the result

```
99b5d7befcadb501fe75b85ed4e8f4c5
```

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hardcore

News, reviews and round ups on the latest hardware technology for your box.

Storage. We all love it, but it seems most people can't properly count its capacity. Hey, it's not your fault.

Like the infamous 'MS time', we're all used to seeing Windows incorrectly deliver us a flawed drive space amount. To be slightly more specific, while at the same time rather vague, it's only half right. The apparently debilitating number is correct, but the *type* of size that's listed is skewed.

You see, counting up from the 8-bit byte, manufacturers have been using the misunderstood megabyte (MB) and not the publicly unknown mebibyte (MiB) system for data capacity. This is why when you purchase a 200GB drive, a chunk seems to be missing. Because neither system is understood.

Known as the IEC binary prefix system, it's built around base 2, unlike the politically correct MB which is base 10 and uses the SI binary prefix system. They end up close, but when you're talking hard drives, you lose wads of space going from IEC to SI.

The kibibyte is 2^{10} bytes (1024 bytes), the mebibyte is 2^{20} bytes (1,048,576 bytes or 1024 kibibytes), the gibibyte 2^{30} bytes and so on through tebibyte, pebibyte and exbibyte.

A 200GB HDD, for example, is 200,000,000 kilobytes: about 195,312,500 kibibytes or 186.26GiB – this being the number Windows reports back to you, only it incorrectly labelled with SI's 'GB'.

If your OS is calculating space to the power of 2, and chances are it is, it should be displaying 'GiB' instead of 'GB'. And chances are it isn't.

On the other hand, the 1.44MB floppy disk – technically 1440KiB, 1.41MiB or 1.47MB – is just a nonsensical pile of lie.

So, it isn't the furry woodland forest critters that steal your space, after all.

Nathan wants to know your drive capacity: nathan@atomicmpc.com.au

thismonth

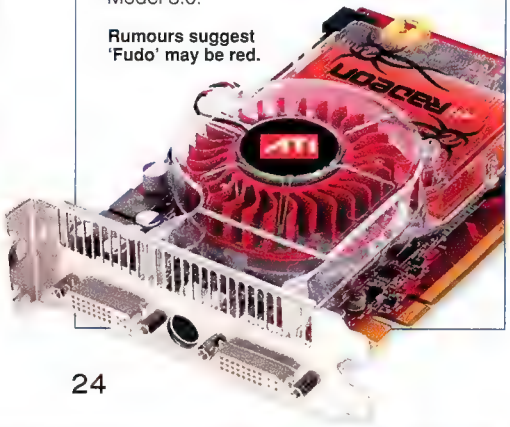
hardcorereviews

shortcircuits

NVIDIA's System Platform Processor (SPP) provides the memory controller for the Intel nForce4 platform.

By the time you read this, NVIDIA's newly released nForce4 chipset for Intel's Socket 775 processors are oozing out onto the market (see *page 33* for our review of it now). Previously known as 'Crush 19', it has been dubbed 'nForce4 SLI Intel Edition' and it brings the full set of tantalising nForce4 features to the table, including SLI support. Unlike AMD's Athlon 64 and FX range, Intel CPUs don't feature on-die memory controllers, so a two-chip solution was created. Now with an nForce chip of their own, Intel fans can probably keep the drool on their side of the fence. It will be interesting to see how the sides compare, particularly in regards to the memory controller performance.

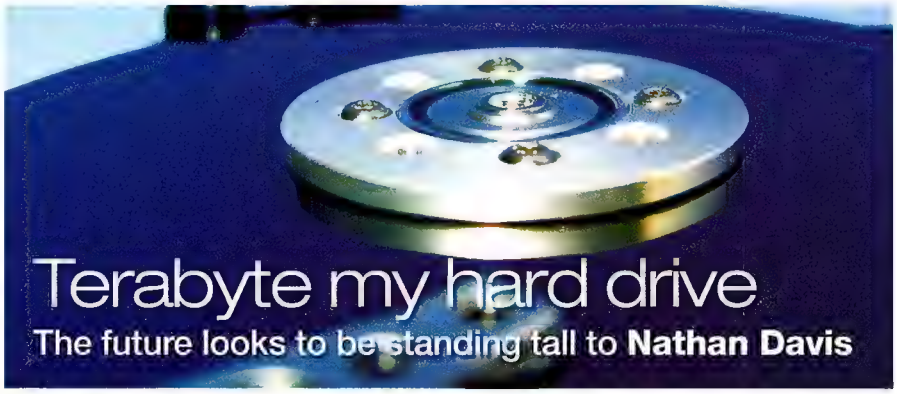
ATI's upcoming R520 GPU – tagged 'Fudo' – will be equipped with 32 pixel pipelines. This is double the 16 rendering pipelines located on both its and NVIDIA's current range of high end gaming cards. What isn't known about these pipelines is whether or not ATI plans on enabling them all from the word go, or simply flicking on 24 so as to extend the product line. That said, even with an additional eight pipes, this is a massive leap and should see a sizeable jump in performance. You can also expect to see Fudo sporting Shader Model 3.0.



Rumours suggest 'Fudo' may be red.

tech trends

Quenching your thirst for the latest technology and hardware happenings



Terabyte my hard drive

The future looks to be standing tall to Nathan Davis

Data storage requirements are exponentially increasing and manufacturers are scarcely satiating our hunger for more storage space, all thanks to a magnetic phenomenon. It was only a few years back when 40GB drives were the rage. Now we're seeing ten times that amount and there's grave concern for how much further magnetic data density can go.

This is where *perpendicular recording* comes in, storing more data on a platter, yet again securing the aging mechanical hard drive's future. Other manufacturers have mentioned this technology in the past, but now it's Hitachi's turn to ring their perpendicular bell. And loudly so, as they've achieved a data density of 230 gigabits per square inch (in^2) via this relatively new technology, compared to the current ~100Gb/in^2. Increasing the data density not only allows for more storage, but also faster access times.

Currently on hard drive platters, data is laid out horizontally. The problem with increasing data density on this longitudinal system is the risk of data being corrupted. Ever since the fifties, engineers have been concerned with an inherent phenomenon on magnetic drives known as the 'superparamagnetic effect'.

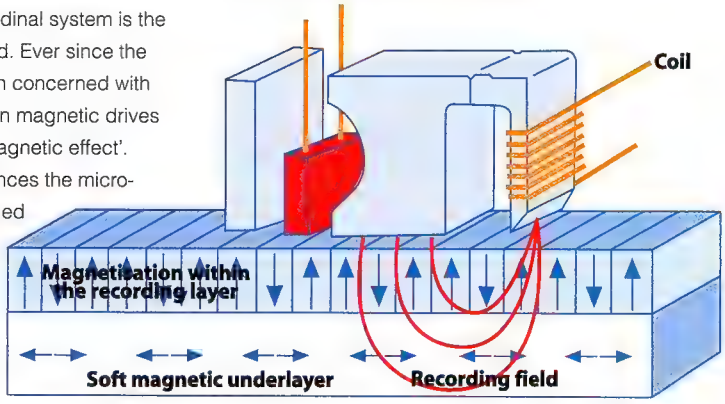
This phenomenon influences the microscopic, magnetically charged particles which hold data. With increased density, these particles grow closer, running the risk of affecting each other. When this risk manifests itself, the north and south poles of the bits are flipped and precious data is rendered useless.

So instead of having the magnetic data storage bits lying flat on the platter and highly susceptible to damage, they have them standing up, perpendicular to each other. Standing the data bits keeps this problematic phenomenon at bay for longer. Another technology known as Heat Assisted Magnetic Recording (HAMR) is expected to carry the density to an incredible one terabit per square inch, according to Dr. Mark Kryder of Seagate.

a few years back 40GB drives were the rage. Now we're seeing ten times that amount

Manufacturers have obviously been piling in the monies for data density R&D. At 230Gb/in^2, Hitachi promises 60GB one inch drives and one terabyte 3.5 inch hard drives are possible.

With all the major players getting behind this, perpendicular recording is the path drives will take. Much has been said, but Seagate's perpendicular drives are almost ready while Hitachi have their marks set on 2007.



The mechanism behind perpendicular recording hard drives.

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PC Case Gear www.pccasegear.com.au Phone : 03 9584 7266
MegaPC www.megapc.com.au Phone : 03 9793 9676
Custom Cases www.customecases.com.au Phone : 03 9327 8494

NSW

ARC COMPUTERS www.arc.com.au Phone : 02 9748 8322

QLD

Quick Solve Computers www.quicksolve.com.au Phone : 07 3804 7400
L33TMODDERS.COM www.l33tmodders.com Email : matt@l33tmodders.com

This device is protected by the following patents:
China Patent No. ZL200420008943.0 Taiwan Patent No. 56525
One or more pending U.S. patent applications

AKG K 26 P

Supplier Audio Products Group
Website www.audioproducts.com.au
Price $79.95

Want a great sounding set of headphones to replace those tacky iPod ear-buds? The AKG K 26 P are thirty dollars cheaper than their rivals, the Sennheiser PX 200, and sound better to boot. They sport semi-DJ stylin', fold up very neatly and have more bass than you can throw a fishing rod at. They're fully closed meaning you won't disturb your neighbours and they can handle high volumes without disintegrating into a cesspool of crackles. Swish.

Cooler Master Real Power 550W

Supplier: Cooler Master
Website: www.coolermaster.com.tw **Price:** US$150

Rumour has it that power is an aphrodisiac. If you want all the juice you can handle, the 550 watts this beast can provide will keep your system sucking down the electrons in droves and retain your insatiable need to scream like a red-hot redneck geek. This PSU will just quietly watch, bemused. It supports all the new standards, such as the new 24-pin ATX power standard, PCI Express graphics connector and SATA power, so you're all set for imminent upgrades.

Water Window Reservoir

Supplier: PC Case Gear
Website: www.pccasegear.com.au
Price: $49.50

We're now entering an era where mods that look mighty trippy are finally becoming useful. Such as blinking lights that signify, you know. . . important stuff that matters. As such, this is no ordinary window kit. Attached with piping, the window is a hollow shell that can be filled with water to act as a water reservoir. Chuck some UV ink inside for water cooling or fill it with Mountain Dew and drink to your liver's doom.

BenQ Joybee 200 256MB

Supplier: BenQ
Website: www.benq.com.au
Price: $219

This stylishly small audio player has an orange and green LCD display, and is a pretty decent player with an intuitive menu system. Supporting MP3 and WMA formats, there was no Ogg Vorbis support at the time of writing, but it's flash updateable. If you're a music hog, you might find 256MB demoralising, but there is a 512MB unit for $269. With line in, a microphone and FM radio, it's a small package of goodness.

GeiL iBall

Supplier AMI Computer
Website www.ami-computers.com
Price $199

With a 96 x 64 OLED colour screen, this funk-a-luscious bottle top is a player of both audio and video. It handles audio extremely well, with a decent selection of options and high quality output, but for video playback, you're looking at under 10fps. It would be much less esoteric if it could read standard movie files, but all video must be encoded in a certain 'MPV' format. Video is best for an occasional glance, but it's a great audio player, packing a surprisingly decent FM receiver.

Extreme Gamer Viper gaming case

Supplier Universal Enterprise
Website www.universalenterprise.com.au **Price** $179

If you have a particular hankering for serpentines, you'll no doubt love the window on this. It's rather meandering. With six 3.5in and four 5.25in bays, there's definitely no lack of swinging room, for which its two handles are useful. If you need a reminder for how much your social life really matters, there's a counter on the box that ticks away the total usage time. The last thing it needed was a PSU, and inside it packs a 500W beast. More sizzling than a can of worms.

Seagate 400GB Ext Hard Drive

Supplier Seagate **Website** www.seagate.com **Price** $599

Packing Seagate's new Barracuda 7200.8 hard drive, it's both quiet, feisty and ready to load a ton of data. Equipped with USB2.0 and daisy chainable FireWire, it'll spill and contain as fast as your ports will let. Fast, large and so voluptuously good it should be fattening. Perfect for the high latency, high bandwidth Sneakernet of Linux ISOs, images and movies from your family holiday and multitudes of game demos. External storage never tasted so succulent, if indeed at all.

Sunbeam Liquid Neon

Supplier XCOM Technology
Website www.xcom.com **Price** $25

It has a damn sweet name but this doesn't really contain a superbly cold cryogenic fluid for cooling beams of light. Sorry to burst your crazy bubble. It's a neon light, and if you don't have at least one, you're severely missing out on where light should be used. In pipes. With this tube, the light appears to wave around and ripple. Quite trippy and guaranteed to keep a good dose of randomness in your perfect machine. Tubular!

Pro Office 650

Supplier Anyware
Website www.anyware.com.au
Price $99

This UPS looks and feels much like a bulky 6.2kg power board, rather than a car battery. Equipped with 650VA/350W worth of capacity, it'll keep an average machine running for around a quarter of an hour when fully charged. It has full protection from overcharge, deep discharge and short circuit protection with phone line protection. It also has a serial and USB line for auto-shutdown. Tagged with a price level around that of a decent standard power board, it's a neat little package.

JAKKS Pacific 5 Classic Namco Arcade games

Supplier PC Case Gear **Website** www.pccasegear.com.au
Price $49.50

With the guise of a hand-sized arcade machine minus the screen, this retro arcade console brings back the memories of past and manages to jerk some wet ones of joy. The controllers have the same click and feel as the originals, having a red-topped four-way joystick and a trigger button. With five games stored on the widget – PacMan, Bosconian , Galaxian, RallyX and DigDug – it was made for a nostalgic retro night. Satisfy your love for the arcades and grab one of these.

Sunbeam Minibaybus

Supplier XCOM Technology
Website www.xcom.com.au **Price** $22

This taupe glow box of LED light is not just a photon emitting ornament. Nor a light sabre. It is, however, a male Molex hub with one input and four out. Vaguely unusual, as female points may have been more useful to most. There is a red and a green LED above the Molex input plug which are there for checking if the 12v and 5v lines are working. But we reckon it's a good excuse to whack more LEDs somewhere.

Gigabyte DVD dual GO-W1616A

Supplier Synnex
Website www.synnex.com.au **Price** $TBA

Beige used to be the accepted norm, but it's long gone. Some people also think that black things go faster (the duds that call the case a 'CPU' or 'modem'). Gigabyte realised this, so included was a black faceplate. With a drive capable of writing at 16x on either DVD-R or DVD+R and 4x on dual layer DVDs and 48x on the aging CD/-R, you'll be spinning discs faster than Mixmaster Mike. It's even boxed with obligatory copies of PowerDVD and Nero express.

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- Detailed, analytical sound reproduction with strong bass response

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- Detailed, analytical sound reproduction with strong bass response
- Intelligent auto-tuning, with memory function
- Rechargeable NiMH batteries included (sizeAAA)

RS 140

- Perfectly suitable for all types of modern music and especially forTV applications
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- Intelligent auto-tuning, with memory function
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head to head

Bite-sized comparative round-ups of the hottest gear

Picture perfect

Forget fancy schmancy monitors, nothing competes with the power of a projector. Bennett Ring rounds up four of the best for your gaming and movie joy.

Most computer dens are darker than the deepest vampire crypt, making them perfect for the ultimate in f&!k off display devices – the front projector. While an 8ms LCD monitor is cool, it can't come close to the sheer, dazzling beauty of a projector, especially for *games*. And thanks to the rapid rate in projector evolution, it's now possible to pick up a high definition baby that will beam a ten foot screen onto the nearest wall for around the same price as your PC. So let the lusting commence!

What to look for

When looking for your first front projection unit, there are two key technologies to consider: *DLP* (Digital Light Processor) projectors have much better contrast ratios and colour reproduction, but they're lower in resolution, and some users suffer from the 'Rainbow Effect' when viewing these projectors. This refers to the fact that some eyeballs are more susceptible to seeing the individual colours that make up the image in a DLP picture, leading to an odd rainbow artefact that is about as pleasant to look at as a monitor running at 30Hz, while simultaneously having toothpicks inserted into your cornea.

The other major projector technology is of course *LCD* (Liquid Crystal Projectors). While the contrast ratio and colour reproduction can't compete with DLP, it's possible to buy a high resolution LCD projector at a much cheaper cost than competing DLP projectors. For example, you'll pay somewhere around $3500 for a 1280 x 720 LCD projector. A DLP projector with the same resolution can set you back significantly more. Resolution might not be quite as important if all you're doing is watching the latest *Spiderman* sequel, but for PC users it's a critical feature.

Therefore the native resolution is a very important feature to look for in a projector – you'll want at least 1024 x 768 for a crisp display, with 1280 x 720 being perfect for widescreen gaming and movie viewing. A 1280 x 720 unit will also run true High Definition 720p, a must if you're looking to move towards HD.

Another important feature to look for is the overall noise level of the unit – there's nothing like a buzzing fan to ruin the suspense of a quiet moment in Doom 3. Bulb life should be checked out too, but most projectors now have a lamp that will last between 2000 and 3000 hours.

If you're thinking of purchasing a projector, demand a demonstration beforehand. This is more important when it comes to projectors than any other device. Similarly, though it costs a little more, consider buying a projector screen as well. Specifically designed to reflect light, they always do a better job than your wall (and those pizza stains on it don't help either). Overall if you take a look at our selection, you'll probably find just what you're looking for.

InFocus ScreenPlay 4805 ▽

Price: $2499 Supplier **Infocus** Supplier Phone **1800 885 481** Specs **DLP technology; 2000:1 contrast ratio; 750 lumens; 854 x 480 native resolution; 3000 hour bulb life.**

The most impressive feature of this entry-level projector is the outstanding contrast ratio – at 2000:1 you needn't worry about losing detail in the murky depths of shadows and darker scenery. It's obvious that DLP is vastly superior to LCD in this regard after viewing this projector.

Unfortunately, where it can't compete, is the native resolution. In the 4805's case, it's limited to a blocky 854 x 480. For the price it's a decent resolution, but it'll make your favourite games look very pixilated.

It's also not designed for short throw projection, so a relatively wide room is required to get the largest picture (not a studio apartment). Finally, a relatively noisy fan soon gets annoying.

Mitsubishi HC900

Price **$3999** Supplier **Mitsubishi Electric** Supplier Phone **(02) 9684 7777** Specs **DLP technology; 4000:1 contrast ratio; 1500 lumens; 1024 x 576 native resolution; 4000 hour bulb life on low mode.**

After viewing the 4805, we didn't think it would be possible to get a vastly superior contrast ratio out of an affordable front projector. After seeing the HC900's 4000:1 contrast ratio, we ate our words. Sure, it's almost double the price, but the colour reproduction and amazing contrast of this projector are simply breathtaking. It makes the competing LCD projectors look dull and washed out.

But that old bugbear of affordable DLPs, low resolution, reared its blocky head once again. At only 1024 x 576, the pixel structure on this projector was clearly visible when playing games. It's not too bad for movie viewing, but is still too low for good gaming.

Panasonic PT-AE-700

Price: **$3899** Supplier: **Panasonic** Supplier Phone: **13 26 00** Specs: **LCD technology; 2000:1 contrast ratio; 1000 lumens; 1280 x 720 native resolution; 3000 hour bulb life.**

It's advertised as having a 2000:1 contrast ratio, but after seeing it in action, we're positive that it's not quite the contrast demon as the DLP projectors are. Where it does excel is the true High Definition native resolution of 1280 x 720. At this resolution it's next to impossible to see individual pixels, and running games at this resolution is simply breathtaking. Just imagine playing a game on a ten foot screen, with no visible pixel structure – the AE700 allows it. A whisper quiet fan means it's pleasing on the eardrums, and the lack of any visible Vertical Banding (a symptom many LCD projectors suffer from) makes it hard to pass up.

Sanyo PLV-Z3

Price **$3899** Supplier **www.sanyo.com.au** Supplier Phone **(02) 8825 2822** Specs **LCD technology; 2000:1 contrast ratio; 800 lumens; 1280 x 720 native resolution; 3000 hour bulb life.**

It might not be quite as bright as the AE-700, but the Z3 is identical in almost every other area. It's got a beautifully high native resolution of 1280 x 720, and is quieter than a bee's sneeze. Like the AE-700, the ability to project a large image over a short range makes it perfect for smaller rooms. The main difference is the inclusion of innovative dust cleaning ports. Projectors are prone to getting dust blobs, which cause large balls of light on the projected image, and they require servicing by professionals to clean. However, the Z3 does away with this tiresome task by allowing you to blow the dust out yourself, via these cleverly designed ports.

Conclusion

When it comes to projectors that are going to be used for both gaming and movie viewing, at this price point LCD still seems to have the edge. Deciding between the AE-700 and PLV-Z3 isn't an easy task, as they're both very close in performance. It comes down to whether you'd prefer the slightly brighter image of the Panasonic, or the ease of cleaning of the Z3. Regardless, both projectors are guaranteed to blow the pants out of every other display device in the price bracket.


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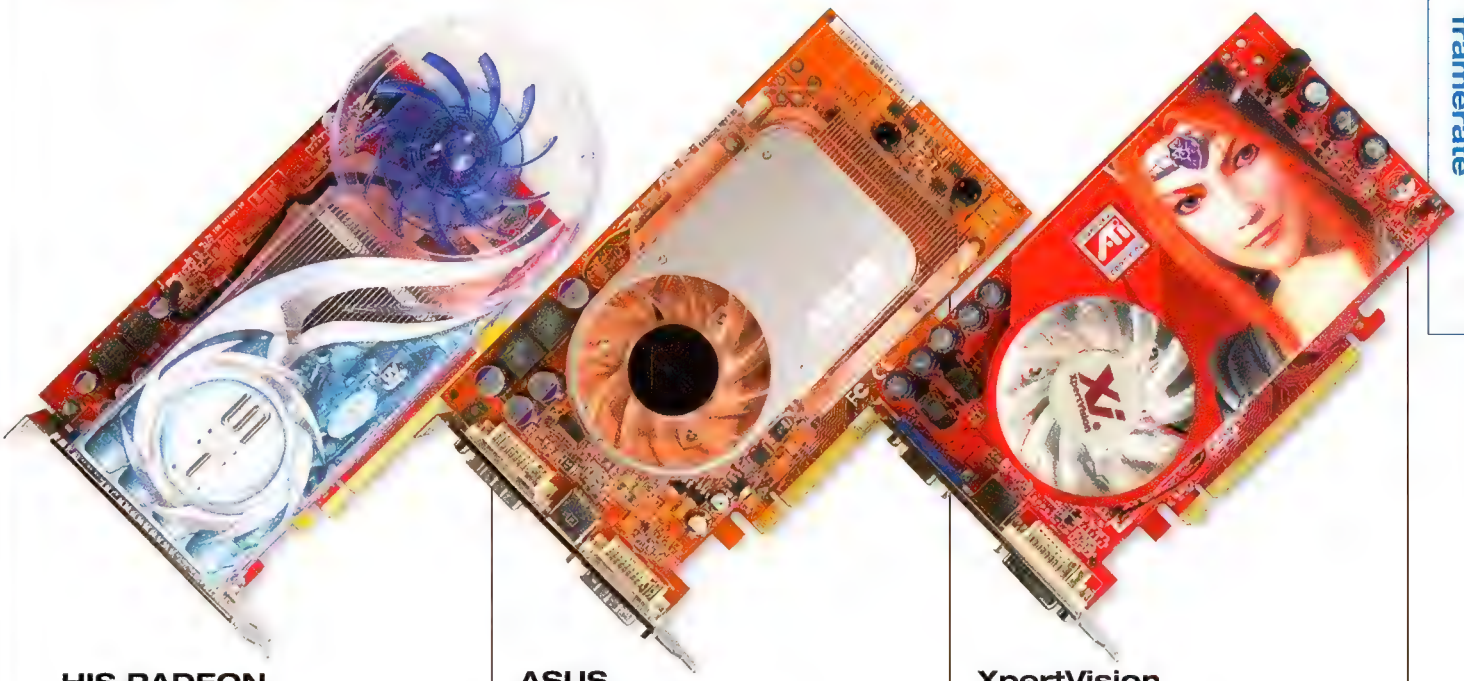


HIS RADEON X850 XT

GPU **ATI RADEON X850 XT**
Memory size **256MB**
Core clock **520MHz**
Effective memory clock **1080MHz**
Memory type **256-bit GDDR3**
Pixel pipelines **16**
Vertex shaders **6**
Video in **None**
Video out **DVI; D-Sub; component; composite; S-Video**
Price **$899**
Supplier **AKA Technology**
Website **www.akatech.com.au**

This fella is a powerful yet quiet card, but this comes at a price: a large heatsink. Generally this won't be an issue, but if you plan on removing the sucker, unlocking it from both the six-pin power cable and the PCI Express slot is slightly more tedious than poking in a pair of unco fingers. Other than that, vaguely bettered by the X850 XT PE chip, this card is full of juicy pipelines that are willing to please you.

ASUS Extreme AX800XL

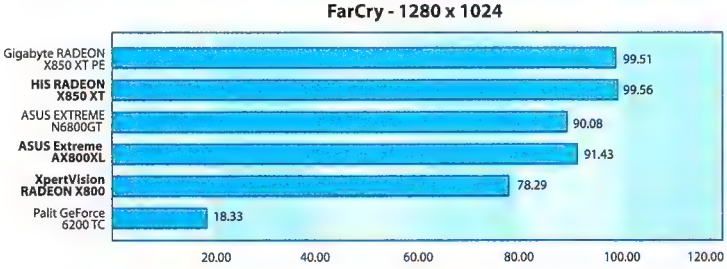
GPU **ATI RADEON X800 XL**
Memory size **256MB**
Core clock **400MHz**
Effective memory clock **980MHz**
Memory type **256-bit GDDR3**
Pixel pipelines **16**
Vertex shaders **6**
Video in **Composite; S-Video**
Video out **DVI; D-Sub adaptors; composite; S-Video**
Price **$749**
Supplier **ASUS**
Website **www.asus.com.tw**

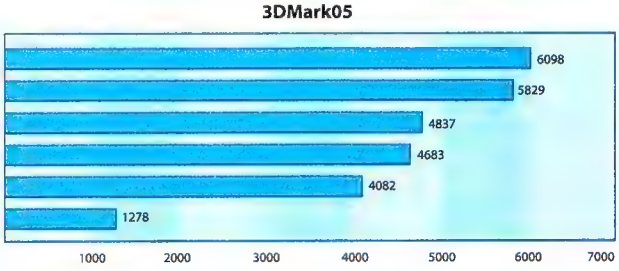
As ATI's new edition of the dwindling X800, the X800 XL is an X800 with four additional pixel pipelines flicked on, bringing it on par with the X850, minus the raw megahertz. This gives the X800 a significant boost with which it can finally match the performance of the 6800 GT. Quieter than most 6800 GTs, the heatsink on this VIVO card doesn't get in the way of installation and the copper heatsink keeps it cool. A very competitive card.

XpertVision RADEON X800

GPU **ATI RADEON X800**
Memory size **256MB**
Core clock **392MHz**
Effective memory clock **900MHz**
Memory type **256-bit GDDR3**
Pixel pipelines **12**
Vertex shaders **6**
Video in **None**
Video out **DVI; D-Sub; S-video**
Price **$459**
Supplier **Altech**
Website **www.altech.com.au**

Sporting an anodised chick on an aluminium heatsink, one might be forgiven for thinking this was a marital aid. Well, it doesn't raise the bar, but this will still excite some decent mid-range satisfaction. With not a lot in the way of supported video formats, this is for the basic gaming setup. The ~1.5cm protruding screws on the back may be a hindrance to those with a mobo chipset close to the north side of the PCI Express slot. A great card for its price range.





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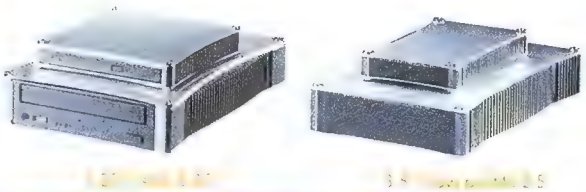

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storage SUPERGUIDE

storagecontents

introduction

Grunty graphics cards. Sexy CPUs. Super fast frequency memory. These are the components that spring to the front of the power PC user's mind every 12 months when the urge to upgrade swings around once again. Yet there's a brick of binary joy buried deep within your PC's innards that receives barely any attention, but demands your financial focus just as much as, if not more than, the other attention-hogging components. Without a hard drive, we'd have no data to pump through the other components. It might not be as sexy as the latest GPU from NVIDIA or ultra GHz beast from Intel, but rest assured that hard drive technology is growing at a rate more than fast enough to keep up with our insatiable need for storage space.

Before the days of digital video and audio, only the most power hungry of specialists needed the copious amounts of space offered by high end drives. Designers in particular had a ravenous hunger for multiple drive solutions, to store the whopping high-resolution files that they toiled away on day after day. Likewise, 3D designers used to snicker at the pitiful storage space that consumers could make do with – just a handful of detailed textures would fill one of these drives to the brim. The ultimate demand for size and speed fell in the server market, where RAID arrays were the norm rather than the exception. The small size offered by consumer drives weren't their only problem – they also fetched data at pathetically slow speeds. The gap between high-end drives and the common man's drive was massive, with little need for it to lessen.

But thanks to the PC's metamorphosis into the digital repository for all of our images, movies and favourite tunes, the average PC user now needs a hefty amount of storage more than ever before. The proliferation of file sharing and high speed broadband has only furthered this need for massive amounts of storage, as it's easy to fill a 60GB hard drive with a mere month's worth of downloading.

Due to the huge size of the files that exist on today's desktop PC, the speed of the drive has also become more relevant. What's the point in having hundreds of gigabytes worth of movies if it's going to take you eons to browse through them all, and then load them into your creative editor of choice? The rapid rise of digital video editing has made the need for a zippy drive even more important for those who like to dabble in a bit of home editing.

The following guide is a snapshot of some of the biggest and best hard drives available for today's PC. We've taken a look at eight SCSI hard drives, as well as eight SATA drives, which threaten to topple SCSI's dominance as the power user's drive format of choice. It's amazing to see just how much storage you can now buy for a few hundred dollars. But we don't doubt that you guys will still be able to fill them up in no time.

Storage.... we're there

Although ASUS is best known for its range of motherboards, barebones systems, notebooks, monitors and video cards, ASUS is also deeply involved with optical drives. DVD, CD – we do it all. And, just like our other products, our optical drives meet the same exacting standards of manufacturing, features and quality. At ASUS, we are committed to providing the best storage products on the market. We do this in a number of ways:

- The 'ASUS Way of Total Quality Management'. Our employees strive to bring competitive, cutting edge products to market without compromising on customer service, manufacturing quality or features. After having won 1048 awards in 2004 alone, we believe we not only meet but exceeded in these areas.
- Passion for technology. Every employee at ASUS has a deep passion for technology. Be it research and development, design or manufacturing, our unique understanding of our products and customer needs allows us to bring better products to market faster, which means you're more prepared and equipped.
- Perseverance. Simply put, we never give up. If our customers need a solution, we'll provide it, through R&D, bringing our devices to market faster and improving or introducing features to empower users.

Right now, we believe optical storage to be a fundamental requirement for every customer, seeing as it is integrated into many business systems. It's hard today to imagine a computer without at least a CD/RW drive, and it is not uncommon for new PCs to be equipped with a combination CD-DVD/RW drive.

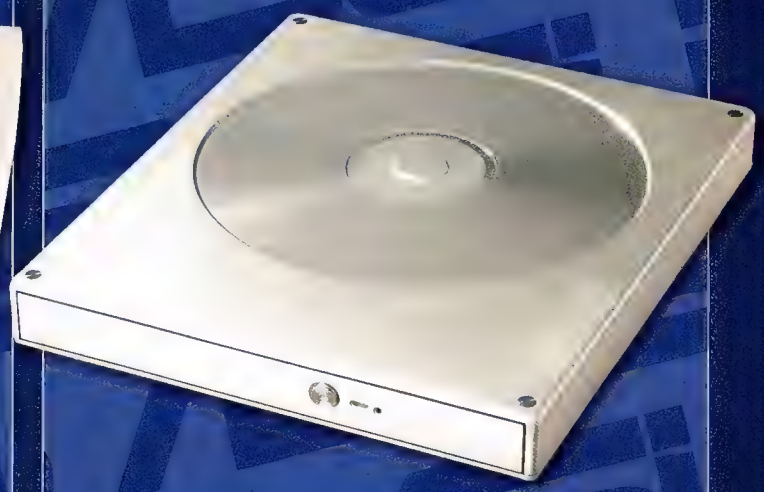
Optical devices in particular serve a unique purpose in that they allow businesses and home users to back-up data, make their own music CDs, video DVDs or photo albums. Optical storage is one of the few storage technologies that is cheap, reusable and distributable, providing even the novice computer user with an enormous entertainment and productivity outlet. With the decreasing cost of CD and DVD writers and writing media, optical storage has never been more affordable or easier. There's really no reason not to have an optical drive capable of burning discs.

In addition, many drives, even the less-featured models, are more than capable of writing at blazing speeds. Almost all combination DVD/CD writers can burn CDs at 52x or 48x, and DVDs at 6x or 4x speed. Almost all drives support dual layer technologies to maximise storage capacities, as well as all DVD standards, including +R, -R, +RW and -RW.

Where there is a need for optical storage, ASUS is more than capable of providing. Not only do we support the industry standards, we exceed them. Our 16x rewrite speed on write-once DVD media is testament to our commitment to the latest technologies and

"We have been continuely impressed with the quality of product from ASUS"

Atomic MPC



ASUS DRW-1608P

The DRW-1608P provides the perfect blend of CD and DVD reading and writing capabilities – all in the one drive. Includes DDSSII, LCT and FlextraLink and FlextraSpeed.

Looking for an internal DVD drive for your business? Need an optical storage product that supports all the current DVD formats while providing a range of useful features? Then look no further than the DRW-1608P. Along with ASUS' own DDSSII and LCT technology, the DRW-1608P supports FlextraLink and FlextraSpeed. These two technologies guarantee that you'll never burn a coaster again. With FlextraLink there's no need to worry about buffer underruns, while FlextraSpeed makes sure you burn at the right speeds, so you won't get stuck with a non-working disc because the burn was too fast for the media.

In addition, the DRW-1608P can burn DVD-R and DVD+R media at an amazingly fast 16x. Burn an 8.5GB disc in a matter of minutes – that's thousands of songs, images or gigabytes of back-up data on a single disc! Cut costs, save time, and know your data is safe with ASUS.

ASUS SDRW-0804P-D

Like the DRW-1608P, the external slim SDRW-0804P-D DVD/CD writer has everything you need in a sexy and portable external optical drive. Includes LCT and FlextraLink and FlextraSpeed.

If you own a laptop, then you cannot be without this amazing drive. Perfectly combining features and practicality with impeccable design, this aluminium wonder is the answer to all your external writing troubles. With full support for all DVD standards, including -R, +R, -RW and +RW and fully-featured with ASUS' unique DVD/CD drive technologies, such as DDSSII and LCT, the SDRW-0804P-D is a product without rival.

It has won numerous international awards, including the 2004 Germany Design award and Taiwan's Symbol of Excellence.

And, just for added convenience, the SDRW-0804P-D supports both high-speed FireWire and USB 2.0, meaning there's no computer it can't connect to. It literally can go anywhere.

Portable, easy-to-use and cool, this drive is customised for road warriors.

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sata hard drives

Designed as a replacement for Parallel ATA drives (PATA), Serial ATA (SATA) drives didn't inspire a great deal of confidence when they first launched several years ago. Tricky configuration options, a lack of native operating system driver support and performance that wasn't any better than PATA drives meant there was little need to make the switch to this new drive interface. Thankfully the situation has changed since then – installing a SATA drive is just as simple as installing a standard PATA hard drive.

Now that SATA has established itself as an easy to use drive format, it's time for the speed increases to start rolling out. While it's still not available on the average PC, SATA 2.0 promises to double the theoretical bandwidth passing through the SATA interface. Instead of the 150MB/s offered by SATA 1.0, SATA 2.0 will offer a blazing 300MB/s. To put these figures into perspective, this speed is approaching that of the expensive UltraSCSI 320 interface.

But even though these speeds aren't yet offered on the desktop, there's a major benefit already to using a SATA drive – cable clutter. Put simply, SATA is a much tidier cabling solution than the bulky IDE cables needed by PATA. While this mightn't sound like such a big deal, as today's CPUs and GPUs continue to imitate hotplates when it comes to thermal output, the use of SATA cables can have a dramatic effect on airflow in your PC case. The fact that they look a damn sight better also makes them more appealing to the case-modding crew.

It's safe to say that SATA is here to stay. While it might not have had the most exciting launch we've seen in the hardware world, it has since moved on to prove itself to be a reliable and sensible progression of hard drive interface technology and it is, like PATA before it, now the de-facto standard from here on in.

Any new system you buy should build off a base of SATA.

Sweet SATA

Aside from the obvious adavantages the SATA and SATA II protocols offer, there are other more inherent benefits to this new age of storage technology.

Key to SATA II, and now back-ported into some implementations of SATA on motherboard controllers and hard drives, is the advent of NCQ, or *Native Command Queuing*.

NCQ is, in short, an advanced mechanism by which both hard drive and controller communicate to place incoming commands into an optimal ordered system. Drives using NCQ are able to better handle loads from multiple applications and users, and deliver faster throughputs while extending the life of the drive through reduced head movements. As with SATA itself, NCQ will eventually become standard in all drives.

Drive	Internal transfer rate (MB/s)	External transfer rate (MB/s)	Sustained transfer rate (MB/s)	Cache (MB)	Avg seek speed (ms)	Average latency (ms)	Spindle Speed (RPM)	Idle acoustics	Quiet seek acoustics
Deskstar 7K500	95	n/a	n/a	8	8.5	n/a	7200	3.1dB	n/a
WD Raptor WD740	n/a	150	72	8	4.5	2.99	10,000	n/a	n/a
Maxtor MaxLine III	n/a	150	n/a	16	9	4.17	7200	n/a	n/a
WD Caviar RE	n/a	150	n/a	8	n/a	4.2	7200	28dB	29dB
Seagate ST3120827AS	85	150	58	8	8.5	4.16	7200	2.5dB	3dB
Maxtor Calypso	n/a	150	n/a	8	<9	4.17	7200	n/a	n/a
Hitachi Deskstar 7K400	n/a	150	61	8	8.5	n/a	7200	3.1dB	n/a
Maxtor DiamondMax Plus 9	n/a	150	n/a	8	<9.3	4.2	7200	2.7dB	3.5dB

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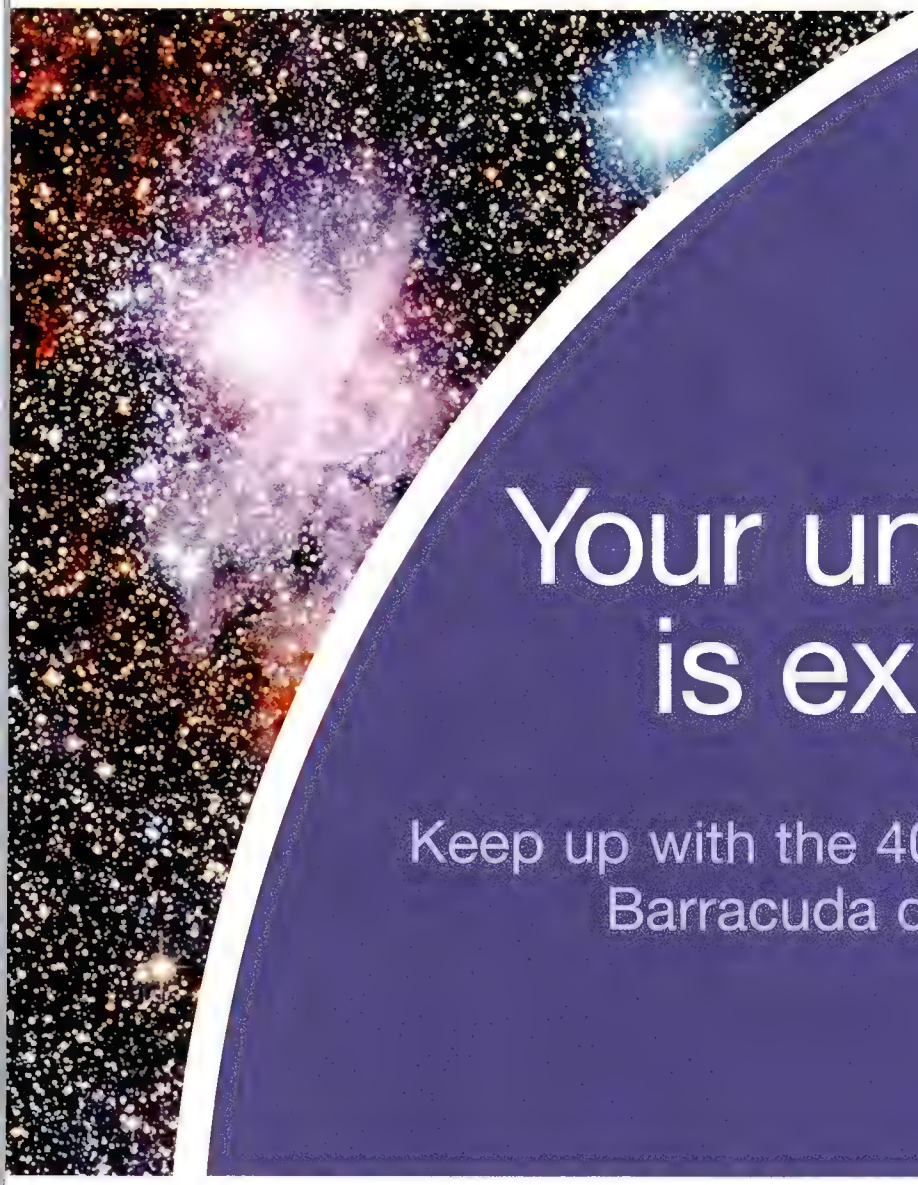

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Hitachi Deskstar 7K500

Capacity **500GB** Price **$800** Supplier **www.hitachigst.com**

This drive takes the cake as the world's largest SATA drive, clocking in at a massive 500GB. You can now have an entire terabyte of storage in your PC with only two drives. It's not the cheapest at $1.60 per gigabyte, but for some people the form factor will be more important. It's also one of the first SATA II drives to hit the market, delivering a burst data rate of 300MB/s. It's also one of the only drives on the market to support NCQ (Native Command Queuing).

To make the most of this feature you'll need a SATA equipped motherboard that is compatible with NCQ, and the major benefit is a performance increase when performing heavy transactional workloads.

It also results in less wear on the drive, which is probably part of the reason this drive has an excellent warranty.

Western Digital Raptor WD740

Capacity **74GB** Price **$275** Supplier **www.wdc.com**

While the Barracuda takes the cake for packing the most amount of data into a single drive, the Western Digital Raptor WD740 has built a solid reputation as one of the fastest SATA drives on the market.

This is due largely to the blazing 10,000rpm spindle speed and 4.5ms average seek speed. As a result of the high spindle speed, it's not the quietest drive around, and it also happens to be a bit of a heat brick, but for those who demand the ultimate in performance these factors aren't really an issue. At $3.72 per gigabyte, it's nowhere near cheap, but that's the price you pay for performance.

Western Digital has also slapped a lengthy warranty on this speed demon, so you can rest assured that it will last you some time.

Maxtor MaxLine III 7B300S0

Capacity **250GB** Price **$260**

Supplier **www.maxtor.com.au**

The MaxLine III is one of the few drives to feature NCQ and the 5-year limited warranty stacks up well compared to the other drives. The inclusion of hot plug functionality is a nice touch. The 16MB of cache doesn't seem to make a marked difference to the drive's performance.

Maxtor Calypso DiamondMax 10

Capacity **200GB** Price **$200**

Supplier **www.maxtor.com**

Like its bigger brother, the Maxline III, this drive also features NCQ. The 7200rpm spindle speed combined with a 9ms seek time isn't going to deliver the world's fastest SATA performance, but you can't really expect SCSI-like speeds at this price point.

Western Digital Caviar RE WD2500SD

Capacity **250GB** Price **$300**

Supplier **www.wdc.com**

Designed specifically for use in a RAID setup, what the Caviar lacks in sheer oomph, it makes up for with exceptional price per gigabyte, at only $1.20. You'll be hard pressed to find anything thriftier. It also makes the price of owning a terabyte that much cheaper.

Hitachi Deskstar 7K400

Capacity: **400GB** Price: **$500**

Supplier: **www.qcgo.com.au**

Hitachi has proven that Seagate isn't the only company that can manufacture a 400GB drive, with the 7K400 offering just as much storage at an identical price. The specs aren't quite as quick as the Seagate though, and the fact that the average latency isn't revealed suggests that it's quite high.

Seagate Barracuda ST3120827AS

Capacity **120GB** Price **$120**

Supplier **www.seagate.com**

For many users, a mere 100GB or so should be more than enough to look after several gig of music, a few games and a handful of digital images. This drive covers these bases nicely, and does so at a remarkably cheap cost – a measly $1 per gigabyte.

Maxtor DiamondMax Plus 9

Capacity: **80GB** Price: **$110**

Supplier: **www.csw.com.au**

The previous generation of DiamondMax drives, the Plus 9 is surprisingly more expensive than the current generation. The highlight of this drive is the Fluid Dynamic Bearing motors, which have a range of benefits including quieter operation and less wear. The drive itself however is relatively costly.

scsi hard drives

When it comes to the ultimate in hard drive performance, SCSI drives are still the clear leader when compared to SATA. As a result they're the only option for those who demand the highest in sustained transfer rates and low seek times. How long this lead can be kept remains to be seen though, with companies such as Western Digital making a serious push to replace this ageing format with SATA drives. While high speed SATA drives are catching up in regards to sustained transfer rates, they still lose badly when it comes to seek times, with a theoretical minimum seek time still up to three times as slow as a SCSI drive.

Additionally, SCSI can support far more devices than SATA per controller, and when combined with high-end I/O processors on SCSI controllers, is the key reason why SCSI is the de-facto choice for any sort of server environment.

The next major innovation in the world of SCSI drives is Serial Attached SCSI (SAS). This serial technology uses a full duplex, point-to-point architecture, delivering data rates of up to 3GB/s. It eliminates the delays that are experienced by today's daisy-chained SCSI setups, as each device is given its own dedicated signal path. However, it's still not readily available, although it promises to become commonplace towards the end of this year.

While everyone would love to have a couple of SCSI drives hooked up in a RAID array within their desktop PC, the cost of SCSI devices still makes them prohibitively expensive for all but the most cashed up home user. The cost per gigabyte is anywhere between five and twenty times as expensive as the cheapest SATA devices.

However, if high performance is much more important than a massive amount of storage, it's still possible to purchase a couple of high speed SCSI drives for less than $500.

SCSI standards and controllers

As a now mature technology the evolution of SCSI has seen it cross many boundaries over the years.

In the past, controllers and drives operated at a measly 10MB/s over an 8-bit bus. Today, superfast controllers and drives shutte data around at up to a staggering 320MB/s over16-bit wide busses. More than this, some SCSI controllers can support a massive 30 devices, far more than the desktop focused SATA. As a result, SCSI still reigns supreme in server environments and for hardcore desktop users who demand speed, reliability, or both.

Naturally, this comes at a cost – SCSI is generally the more expensive route to take, but here as with many other areas of computing, you get what you pay for.

Drive	Internal transfer rate (MB/s)	External transfer rate (MB/s)	Sustained transfer rate (MB/s)	Cache (MB)	Avg seek speed (ms)	Average latency (ms)	Spindle Speed (RPM)	Idle acoustics
Seagate Cheetah 15K.4	685 – 1142	320	n/a	8	n/a	n/a	15,000	3.6dB
Maxtor Atlas 15K II	n/a	320	98	8	3	n/a	15,000	3.6dB
Fujitsu MAS3735NC	115	320	57 – 76	8	3.5	2	15,000	<3.6dB
Fujitsu MAP3367NP	107	320	40 – 70	8	4.75	3	10,025	3.4dB
Seagate Savvio	n/a	320	Up to 63	n/a	4.3	n/a	10,000	n/a
Maxtor Atlas 10K IV	820	320	Up to 72	8	4.5	3	10,000	3.2dB
Seagate Cheetah 15K.3	632 – 891	320	n/a	8	n/a	2	15,000	3.5dB
Seagate Cheetah 10K.7	472 – 944	320	n/a	8	5	3	10,000	3.3dB


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Seagate Cheetah 15K.4 ST3146854LW

Capacity **36.7GB** Price **$430** Supplier **www.seagate.com**

It's obvious to see the price difference between SCSI drives and SATA drives when looking at the first in our batch of SCSI drives, Seagate's Cheetah 15K.4. At a whopping $11.71 per gigabyte, it's eleven times the price of the cheapest SATA drive. Yet when it comes to the most demanding of tasks, there's simply no doubting the ability of SCSI to deliver data at the rates needed by multiple simultaneous applications or users. And when it comes to speedy SCSI drives, the Cheetah is an aptly named device.

Seagate claims that this drive is the quietest and coolest Cheetah yet, although it still operates at room warming temperatures. It's also got an increased mean time between failures over the prior generation of Cheetah, up from 1.2 million to 1.4 million hours.

Maxtor Atlas 15K II

Capacity **147GB** Price **$2100** Supplier: **www.maxtor.com.au**

This drive is the first of Maxtor's SCSI drives to make the switch to Fluid Dynamic Bearing motors. This has helped increase the drive's reliability, at the same time as lowering the overall noise output. Like the Cheetah, this drive has a rated mean time between failures of 1.4 million hours, and ships with a comprehensive 5-year warranty. The initial version of the drive uses the Ultra320 parallel SCSI interface, but due to the rapid uptake of Serial Attached (SAS) SCSI configurations, a SAS version is on the near horizon.

Like most of the high end SCSI drives on the market, the Atlas uses a 15,000rpm spindle combined with an average seek time of 3ms. This results in a speedy maximum sustained transfer rate of 98MB/s. A large cache isn't necessary for this high performance, with the Atlas only containing 8MB.

Fujitsu MAS3735NC

Capacity **73.5GB** Price **$690**
Supplier **www.fcpa.com**

While it doesn't offer the exceptional performance of the Cheetah or Atlas, this drive is still no slouch when it comes to sustained transfer rates.

It averages somewhere between 57 and 76MB/s, but comes at a much more affordable price, with a cost per gigabyte of $9.38.

Maxtor Atlas 10K IV

Capacity **73.4GB** Price **$370**
Supplier **www.maxtor.com.au**

When it comes to setting new standards for affordable SCSI drives, the Atlas 10K IV series is hard to beat. It offers blistering performance, with a maximum sustained transfer rate of up to 70MB/s. Bear in mind that this is 'up to' so it will perform at a lower speed under normal, everyday circumstances.

Fujitsu MAP3367NP

Capacity **36.7GB** Price **$240**
Supplier **www.fcpa.com**

At only $240, the cost per gigabyte for this drive works out to a very affordable $6.54, while still offering performance that is very close to its bigger brother, the MAS3735NC, with an average sustained transfer rate between 40 and 70MB/s. You'll be hard pressed to find better performance at this price point.

Seagate Cheetah 15K.3 ST373453LW

Capacity **73.4GB** Price **$1100**
Supplier **www.seagate.com**

The prior generation of Cheetah still offers exceptional transfer rates, but the cost per gigabyte is substantially higher. At $14.99 per gig, it makes sense to go with the newer 15K.4 drive. It also has a lower mean time between failures at 1.2 million hours.

Seagate Savvio ST936701LC

Capacity **36.7GB** Price: **$720**
Supplier: **www.seagate.com**

The standout feature of this drive is the fact that it's a 2.5in drive, compared to the 3.5in form factor used by all other SCSI drives. The convenience of this tiny size comes at a significant cost though, with the Savvio weighing in at a whopping $19.16 per gigabyte.

Seagate Cheetah 10K.7

Capacity **73GB** Price **$400**
Supplier **www.seagate.com**

This is Seagate's last 3.5in 10,000rpm drive as it makes its push to the 2.5in form factor. Like the newer 15K.4 drive, it increases the mean time between failures up to 1.4 million hours. In terms of cost per gigabyte, the 10K.7 is one of the cheapest Ultra320 SCSI drives on the market, coming in at $5.43 per gig.

optical drives

The humble optical drive can be credited with revolutionising the home PC. Thanks to the immense capacity offered by CD-ROMs at the time of the first CD-ROM drive, it was possible to cram amazing amounts of data on to a relatively cheap medium. Full motion video and high fidelity sound became the norm, and it's now impossible to find a PC without at least a CD-ROM drive.

But the days of a lowly CD-ROM drive are well and truly numbered thanks to the proliferation of DVD-ROM technology, and lets face it, it's about time too!

Unfortunately, early DVD standards weren't particularly co-operative and as a result a standards war ensued. This led to a confusing mixture of formats, each of which was totally independent from the rest.

Thankfully the format wars have come to an end. Not because one standard won out over the rest though. Instead, today's DVD burners now support every single DVD format, and deciding which one to use usually comes down to whichever media you find the cheapest.

Additionally, as the technology behind burning has evolved, you'll find today's drives sporting large caches and nice features like the burn protection and the ability for drives to autosense the fastest writing speed of media.

The latest innovation to hit the DVD writing market is the introduction of dual-layer burners. These almost double the overall storage capacity of single layer drives, up from 4.7GB to a massive 8.5GB. The problem with dual-layer drives is that they take much longer than twice the time of a single layer drive to fill a disk. This shouldn't remain a problem for too long though, as it's now possible to pick up a dual-layer drive that whips through a dual-layer disk at 6x speeds.

The future, of course, lies with Blu-ray and HD-DVD (see 'War of formats) – the next big things under development from a conglomerate of consumer electric companies. While HD-DVD is finding a home with the Hollywood crowd, Blu-ray is planned for use in the PlayStation 3, and will more than likely be used for data storage and similar tasks.

War of formats

Two opposing next generation optical storage models looming on the horizon are threatening to suppress the optical storage market – Sony's Blu-ray and Toshiba's HD-DVD.

Both have impressive spec sheets, however the technologies are distanced so far apart that its logical two optical drives would be required for the use of both mediums. Drives supporting both mediums are far more unlikely than drives today that support all three current DVD formats.

It was looking gloomy, but just recently both Sony and Toshiba have agreed to look at creating a more standardised form of next generation optical storage.

Whether or not this revelation will hold off an otherwise earlier launch of next generation optical drives is unknown.

In the end, a standardised technology would be a saner solution.

Name	DVD-ROM speed	CD-ROM speed	DVD+R	DVD-R	DVD+RW	DVD-RW	Dual-layer burn
SONY DDU161288	16x	40x	No	No	No	No	No
ASUS DVD-E616	16x	48x	No	No	No	No	No
AOpen DVD-1648	16x	48x	No	No	No	No	No
Samsung SACDCSAM48XCOMB	16x	48x	No	No	No	No	No
BenQ DW1620 Pro	16x	40x	16x	16x	4x	4x	4x
ASUS DRW-1608P	16x	40x	16x	16x	8x	6x	6x
Pioneer DVR-A09XL	16x	40x	16x	16x	8x	6x	6x
LiteOn LDW 1673S	16x	48x	16x	16x	8x	6x	No

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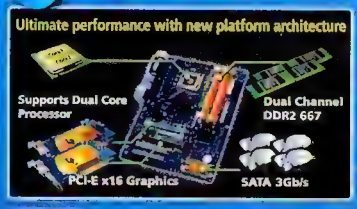

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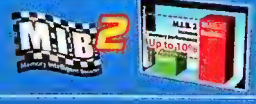

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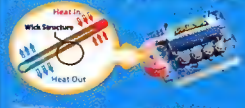

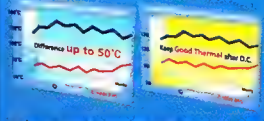

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DVD Burner - Double Layer (16x)

Model (internal)	SOHW-1673S (double layer)		SOHW-1693S (double layer)	
DVD Family	DVD ± RW		DVD ± RW	
Type	[+]	[-]	[+]	[-]
Write	16x	16x	16x	16x
Rewrite	8x	6x	8x	6x
Read	16x	16x	16x	16x
CD Family	CD-RW			
Write	48x			
Rewrite	24x			
Read	48x			
Data Buffer Memory	2MB			
Support Media	DVD: DVD single/dual layer (PTP/OTP), DVD-R, DVD+R, 4x Double Layer DVD+R9, DVD-RW, DVD+RW | CD: All CD-ROM/R/RW formats		DVD: DVD single/dual layer (PTP/OTP), DVD-R, DVD+R, 4x Double Layer DVD±R9, DVD-RW, DVD+RW | CD: All CD-ROM/R/RW formats	

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DVD READER

SONY DDU161288 DVD-ROM

Price **$40** Supplier **Sony** Web **www.sony.com.au**

In the field of consumer electronics, Sony has established itself firmly as a premium brand. Its products are usually innovative and attractive, not to mention rather pricey. So it was quite surprising to see that one of the cheapest DVD-ROMs on the market came from this company.

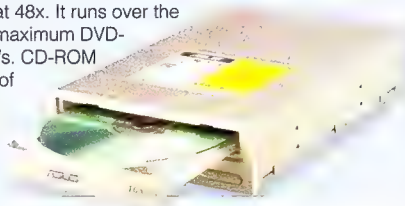
Operating at 16x for DVD-ROMs and 40x for CD-ROMs, this drive churns through your optical media like there's no tomorrow. It uses constant angular velocity to maintain these high speeds, which results in a cheaper construction cost, not to mention it suffers from less problems with high speed media.

As expected, this drive supports digital audio output, and is configurable for any region. According to Sony it's blessed with low vibration, which should keep the drive nice and quiet even when it's spinning your disks at top speed.

ASUS DVD-E616 DVD-ROM

Price **$52** Supplier **ASUS** Web **www.asus.com.au**

This drive will spin up your DVD-ROMs at a maximum speed of 16x, while its CD-ROM speed maxes out at 48x. It runs over the ATA100 interface, delivering a maximum DVD-ROM transfer rate of 21,640KB/s. CD-ROM offers a maximum transfer rate of 7200KB/s. Like the Sony drive, it utilises CAV to keep things nice and simple, not to mention reliable.



AOpen DVD-1648 DVD-ROM

Price **$40** Supplier **AOpen**
Web **www.aopen.com**

Using the slower ATA33 interface doesn't hinder this drive's performance. When running your DVD-ROMs at 16x it whips through the data at 21,632KB/s, while the 48x speed CD-ROM churns over data at 7200KB/s. The firmware is also easily upgradeable.

Samsung SACDCSAM48XCOMB

Price **$80** Supplier **Samsung** Web **www.samsung.com**

It might be double the price of the cheapest DVD-ROM drives on the market, but the ability to burn CD-ROMs makes it worth it. Burning CD-R disks takes place at a respectable 52x, while re-writes are burnt at 24x. Buffer underrun protection should stop you from turning your PC into a drinks coaster factory, with 2MB of buffer memory being more than adequate for the task.

DVD BURNER

BenQ DW1620 Pro

Price **$90** Supplier **BenQ** Web **www.benq.com.au**

Remember when DVD writers cost upwards of $900? Drop a zero off that figure, and you'll see how cheap it is to purchase a DVD writer these days. What's even more impressive is the fact that this $90 burner isn't some single layer beastie shackled to a capacity of less than 5GB. Nope, this baby is quite happy to burn your dual layer disks at 4x speed. It's a ripper at burning your single layer disks as well thanks to a feature BenQ has called Over-speed burning. If you feed this drive with 8x single layer disks, it's possible to reach the lofty heights of 12-16x speeds, whipping through 4.7GB of data in a breathtaking six minutes or so.

Like most decent burners, this drive handles all four major formats (+R, -R, +RW and –RW), and basic burning software is included.

ASUS DRW-1608P

Price **$100** Supplier **ASUS** Web **www.asus.com.au**

Supporting all of the major DVD standards, this drive is yet another example of how cheap DVD writers have become. There's really no point in spending almost as much on a CD writer when you can buy a DVD writer for a fraction more. The highlight of this drive is its ability to burn DVD+RW at 8x, as well as churning through dual layer +R and –R at 6x speeds.

Pioneer DVR-A09XL

Price **$140** Supplier **Pioneer** Web **www.pioneeraus.com.au**

As well as being an extremely fast performer, keeping up with the leaders in the pack, this Pioneer drive has established a reputation as producing some of the most reliable burns of all drives.

It's a little more expensive than some of the cheaper offerings, but this is rounded out by an extensive software package, including DVD MovieFactory 3.5 SE Suite Deluxe and DVD Workshop 2 SE.

LiteOn LDW 1673S

Price **$85** Supplier **LiteOn** Web **www.liteon.com**

You can't look at DVD burners without including LiteOn. This brand has established itself as offering excellent performance for a very affordable price, and the LDW 1673S is no exception. However, the once massive lead that LiteOn used to enjoy has been slowly eroded by the other DVD manufacturers. As a result, this drive isn't noticeably cheaper than the competition, but it's still just as fast as you'd expect at this price point.

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portable storage

Removable, portable storage has to be one of the greatest tech evolutions of the last ten years. Every six months there's a flash drive with double the capacity of its predessor, yet is half the size, or a micro drive so tiny it flies in the face of sanity. How these little data holders manage to carry gigabytes of informtation with the minimum of hassle is simply amazing. We even have a choice of two varieties.

On one front we have flash-based storage solutions. These units tend to have faster read and write speeds than their micro drive brethren but, because of the cost of flash memory, are often small, topping out at 2GB for anything reasonably priced.

The flipside of the coin is micro drive storage, which is exactly the same as the magnetic kind you find inside your computer, except it operates at smaller tolerances. This gives it a dramatic increase in data density over flash, with little extra cost involved. The disadvantage is slower reading and writing speeds. Many however are willing to sacrifice this for sheer versatility – an 80GB compact drive, or even 5GB micro drive will store much more than a 512MB flash device.

USB has replaced FireWire as the standard transport medium and indeed, USB 2.0 is the only way to get data onto any of the products on this page. With 480MB/s of raw speed just waiting to be used, you'd think USB 2.0 would be the way to go. This isn't exactly the case. FireWire is still noticeably faster than its counterpart, even though it is rated slower – the only reason USB is ubiquitously supported is because you do have to pay royalties to Apple for including support for it, something that has plagued FireWire since its inception.

You'd be hard pressed these days to find a system that supports FireWire, let alone FireWire and USB. That's why, despite being faster, USB is the standard for portable storage. Keep in mind that there are still newer portable drives available that support the IEEE-1394 standard.

The other factor that has made portable storage popular today is that new models don't require you to lug around a power adaptor. Even the bigger capacity drives are happy to run from the 5V@500mA supplied by USB, meaning all you need to do is carry the connector cable and the drive itself. Most have also phased out the need for custom software and anyone running Windows 2000 or better can simply plug the drive in and access it immediately, making the regular transfer of data to and from the drive for all practical purposes a seamless experience.

Yes, portable storage has evolved quickly. It's now easier than ever to get information from one PC to another, without logistics being a major concern. Add to this the affordable nature of large-capacity portable storage, and there's simply no reason why you shouldn't be without a stick of flash or a portable micro drive.

musical megabytes

A side benefit of buying an MP3 player, be it a flash or micro drive-based unit, is that most can double as portable storage devices in addition to playing your favourite tunes.

The Apple iPod, for example, comes in 20GB and 40GB varieties – ample space for storing whatever you could imagine, and still have plenty of room for your music collection.

The only disadvantage with MP3 players is that many require custom software in order to upload either data or music to the player, and some actually won't allow you to upload anything but music files.

Additionally, many players these days are adopting smaller capacities because people have difficulty filling 20GB of space with just music. The Apple iPod Mini and Creative Zen Micro feature 4GB and 5GB respectively, and most find this more than adequate for their needs.

That's why if you're after portable storage, it's best to get a dedicated device, like those here, or to research your MP3 player before you buy it. Keep in mind that some MP3 devices require a power adaptor in order to charge, or even to be used with a PC.

Product	[illegible] Orange Thumbdrive	[illegible] 2.0 Device Flash Drive	Bond [illegible]	Apacer Handy Steno HN212	Western Digital Passport [illegible]	MSI Mega Cache	Seagate 5GB USB 2.0 Pocket Hard Drive	Seagate Portable Drive
Price	US$249	$219	$109	$159	$299	$199	$299	$599
Capacity	2GB	1GB	256MB	512MB	80GB	1.5GB	5GB	100GB
Storage type	Flash	Flash	Flash	Flash	Magnetic	Magnetic	Magnetic	Magnetic


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MAGNETIC STORAGE

Western Digital Passport USB Drive

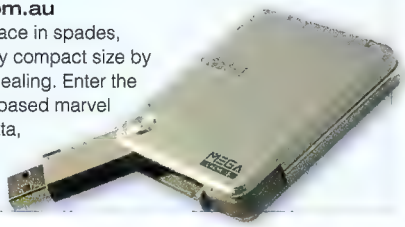
Price **$299** Supplier **Western Digital**
Website **www.westerndigital.com**

Western Digital's 2.5in Passport drive is a testament to just how far portable storage has come. Packed in this tiny and sleek plastic carapace is a whopping 80GB of preformatted space, just waiting to be used for movies, games, music – whatever you need to carry. Even more amazing is the fact that the 5200rpm drive is powered only by what it gets from your USB port, meaning that you don't have to carry a power adaptor. In fact, the inside of the packaging tells you straight away it's going to be easy sailing – there's the drive, a quick-start guide and the connector cable. That's it. Probably the easiest portable hard drive you could use.

MSI MegaCache

Price **$199** Supplier **MSI**
Website **msi-computer.com.au**

While the WD Passport has space in spades, sometimes having an extremely compact size by sacrificing storage can be appealing. Enter the MegaCache. This micro drive-based marvel actually stores quite a bit of data, 1.5GB to be exact. Not a bad product at all.



Seagate 5GB USB 2.0 Pocket Hard Drive

Price **$299** Supplier **Seagate** Website **www.seagate.com**

Exactly like the name says, this is storage that fits comfortably in the pocket. Sporting a nice, tidy 5GB of space, it's everything you could want in portable storage, plus more. Like the other drives here, there's no need for an external power source, and the connector fits snugly around the unit, making it the pinnacle of convenience. The only thing it doesn't do is make cupcakes.

Seagate Portable Drive

Price **$599** Supplier **Seagate** Website **seagate.com**

If space is what you're after with everything else second, then Seagate's crazily massive 100GB portable drive is the kid for you. Easily dwarfing most of the other products here, the only thing that might make you think twice about picking this up is the price. Regardless, it is an impressive unit, sporting a 5200rpm 2.5in drive – all powered from USB.

FLASH STORAGE

SanDisk Cruzer Titanium

Price **US$249** Supplier **VME Systems**
Website **www.sandisk.com**

Two gigabytes. Let's repeat that: Two gigabytes. That's huge for a flash-based device, and it really does kick arse. While it can't compete with magnetic portable devices, as far as flash drives go, this is the golden ticket. It is a bit pricey, but who said convenience comes cheap? In the end, it's not much of an issue, considering how compact this unit is. With 2GB of space to play with in an area less than that of the palm of your hand, you really can't complain.

The SanDisk Cruzer Titanium is perfect for anyone who needs a lot of space, but not an insane amount of space.

Imation USB 2.0 Swivel Flash Drive

Price **$219** Supplier **Imation**
Website **www.imation.com.au**

Flash drives will keep getting bigger. Some even think it will replace magnetic storage as the norm. Until then, we have products like Imation's 1GB Swivel Flash Drive. Perhaps the most attractive aspect of this device – apart from the 1GB of space – is it's feature set and the tidy swivel design. Very nice.

BenQ U-Disk 256MB

Price **$109** Supplier **BenQ**
Website **www.benq.com.au**

It is easy to understand why someone might be more than happy with 256MB of space on a portable device. Not everyone has gigaquads of data to haul around. In this case, something like BenQ's U-Disk is ideal. Small, reasonably valued and perfectly able with a 256MB capacity, the U-Disk is ideal for the odd file copy and transfer.

Apacer Handy Steno HN212

Price **$159** Supplier **Apacer**
Website **www.apacer.com**

If you're after the Swiss Army knife of USB flash drives, then the Handy Steno HN212 is the one you want. The large 512MB capacity is complemented by fast read and write speeds, and the bundled utilities allow you to easily compress data, secure it with a password, or even turn the drive into a boot device. Wonderfully versatile.

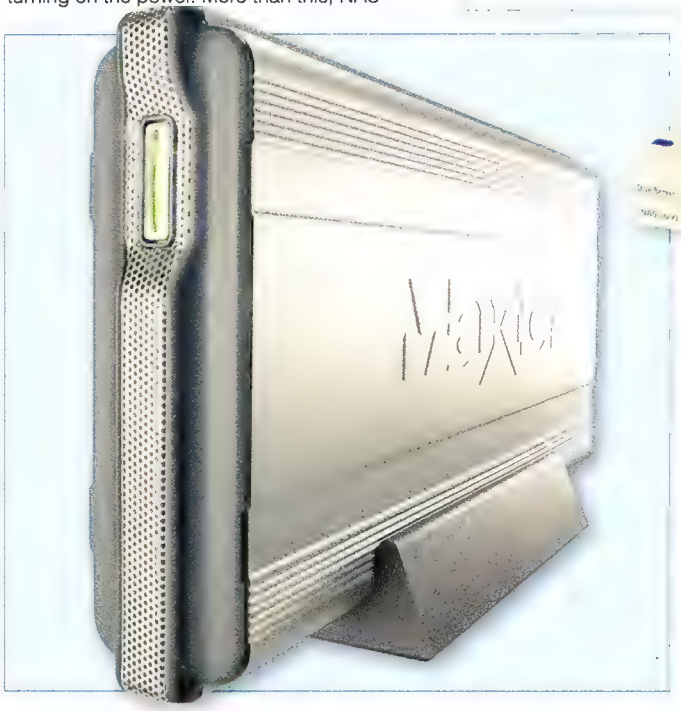
network attached storage

With the uniquity of networks, both in the office and at home, the realm of storage has naturally branched out to take advantage of a networked world. When it comes to expanding the story capacity of a system or network, and especially if widespread access to the stored data is required, there's nothing simpler than to add a *networked attached storage* device.

NAS hardware utilises the advantages of both storage and network technology and allows you to add extra storage space to a network by literally hooking it to a hub and turning on the power. More than this, NAS devices run embedded operating systems that allow you to share data and configure access to a variety of networks ranging from Windows to Unix. They are, for a change, one of the few devices that really live up to the plug and play moniker – attach the power, plug in an RJ45 cable, and voila your network's storage capacity can be instantly expanded.

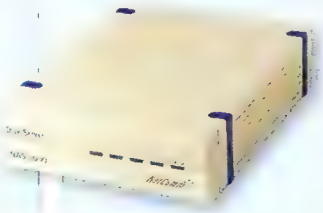
While all the devices here are wired, keep an eye out for a range of wireless NAS devices coming soon, making it even easier to add storage capacity to your network.

Name	Link	Capacity	Expandable
Maxtor Shared Storage drive 300GB	10/100	300GB	Yes
Netcomm NAS1120	10/100	120GB	No
Linksys EverFast NAS 250GB	10/100	250GB	Yes
Linksys Network Storage Link	10/100	N/A	Yes



Maxtor Shared Storage drive 300GB

Price **$549** Supplier **www.maxtor.com.au**
Web **www.maxtor.com.au**
This sleek looking NAS sports a massive 300GB of networkable storage goodness and a host of smart features to boot. Should this somehow prove insufficient, two USB ports allow the hookup of additonal external USB powered drives – or alternatively, being USB, printers. With some clever bundled software that allows you to drag and drop files onto the drive and have them automatically sorted by file type, Maxtor's entry into the NAS market is an excellent combination of space, features, and price.



Netcomm NAS1120

Price **$1320** Supplier **Netcomm**
Web **www.netcomm.com.au**
Netcomm's NAS1120 sports a feisty 120GB of NAS goodness. As with its compatriots, the NAS1120 also features a print server, browser based administration, and the ability to serve files to both Windows and Mac machines alike. A good middle of the road solution if you need snap-in network storage but don't want to break the bank.

Linksys EverFast NAS 250GB

Price **$1990** Supplier **Linksys**
Web **www.linksys.com.au**
The EverFast NAS 250 adds, as the name implies, a whopping 250GB of network attached storage, but that's only the half of it. There's space for a second 250GB drive, upping the total available storage to 500GB. Additionally, the device doubles as a print server. A selection of tools including backup and degfragmentation make the EverFast NAS 250 an attractive all-in-one solution.

Linksys Network Storage Link

Price **$159** Supplier **Linksys**
Web **www.linksys.com.au**
The NSL is an innovative take on the NAS stereotype – it doesn't come with any built-in storage but does, however, allow you to hook up just about any USB-compatible storage you care to share. Supporting USB 2.0 and configurable over the network through a browser, it's a cheap and efficient solution for expanding your network.

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Intel Pentium 840 Extreme Edition

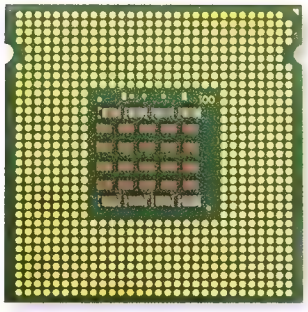
Nathan Davis flaps his albatross wings over a multithreaded dual-core.

specs

Price **$TBA**
Supplier **Intel**
Website **www.intel.com**
Specifications **Intel Pentium Extreme Edition; LGA 775; two 3.2GHz Prescott cores; one 1MB L2 cache per core; 800MHz FSB; .09-micron fabrication process; EM64T; HyperThreading; 125W thermal power rating.**

As we've mentioned in the past, the clock race is over; Intel and AMD are now focussing on the features that are packed onto the processors. In fact, this dual-core CPU operates at 3.2GHz. The reason for this drop in speed is evident, as it's logical that two cores will operate significantly hotter than one – listed as pumping out 125W of heat.

As you may have noticed, Intel has dropped the '4' from the naming scheme, now opting for 'Pentium D' and 'Pentium Extreme Edition' for their dual-core CPUs. The only difference between the two is the Pentium EE features HyperThreading. Aside from that, everything else is identical. Sporting Intel's EM64T 64-bit architecture, they both consist of two conjoined 90nm Prescotts with 1MB L2 cache each and they both share a surprisingly meagre 800MHz FSB.



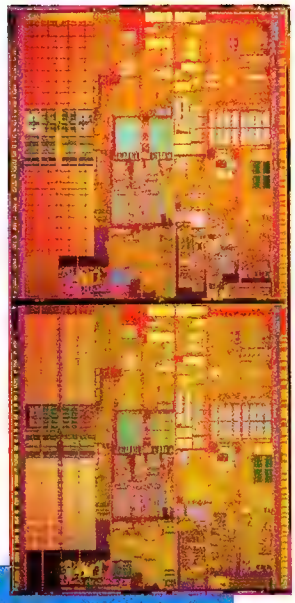
With dual core and HT, this does in fact mean the Pentium EE will be capable of executing four concurrent threads, appearing as a quad-CPU-based system to the operating system. This means the Pentium D will appear in Windows as HT processors have in the past – a dual-processor – albeit, theoretically with more grunt. AMD and Intel are adamant on unleashing their dual-core processors in different markets, with AMD focussing on the enterprise market and Intel opening fire on the desktop market. This is an interesting move, particularly by Intel, as usually the market that most benefits from multi-cored, multi-threaded systems is on server platforms. This is good for us consumers though, as getting these processors into peoples' machines is what will make the developers more inclined to program multi-threaded software.

Testing took place on an engineering 955X board, with two 512MB sticks of DDR2 667MHz and a RADEON X850 XT, thrown against a P4EE 3.73GHz on the same test bed with HT left on. It was beaten in Doom 3, and this was likely due to the P4EE's 1066MHz FSB and core clock difference, it didn't seem to benefit from the four additional threads. As expected, it really does excel in multi-threaded applications such as image processing, scoring 24.14 megapixels per second over the P4EE's 16.68 in PCMark04.

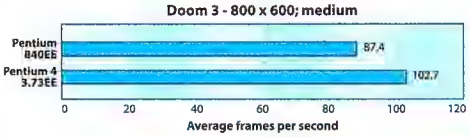
The 840 was hovering well under 100 percent CPU usage when encoding video, so we loaded up an additional encoding instance to test its multi-tasking capabilities. It managed to encode 72 percent of both of these two videos in the same amount of time it took with one clip (10:40). Then while playing a game of silky smooth Doom 3 at 1280 x 1024, high quality, we had it encode one instance. It spat it out in 12:09 minutes which is still faster than the P4EE solely encoding video at 100 percent CPU usage.

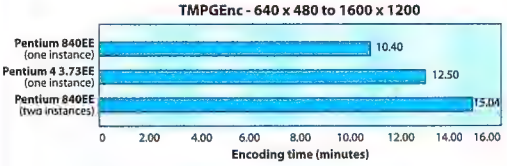
In order for dual-core processors to strut their stuff at all, the software that runs on them must be multi-threaded, otherwise they perform on par as a similar processor. On the desktop side, the only software that has been boosted with multi-threaded support are multimedia applications such as 3D renderers, video encoders and image editing suites. Games are among the rest of the pack that are single-threaded and really won't see a boost until they are programmed to do otherwise.

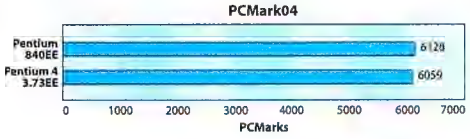
It may be best to wait for the technology to be properly realised, but if you're already a heavy multi-tasker, into multimedia, or just love having the latest, the 840 just might be tantalising enough.



Die shot of the 840's two Smithfield Prescott cores. Aside from the bridging between the two conjoined cores, they're identical.







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for K8N Neo2 Platinum

HardOCP MustHave Hardware
K8N Neo4 Platinum/SLI=K8N Diamond in US region

Atomic Magazine "Hot Award"
for K8N Neo4 Diamond in Australia (May 2005)

K8N Diamond

K8N Neo4 Platinum

K8N Neo2 Platinum

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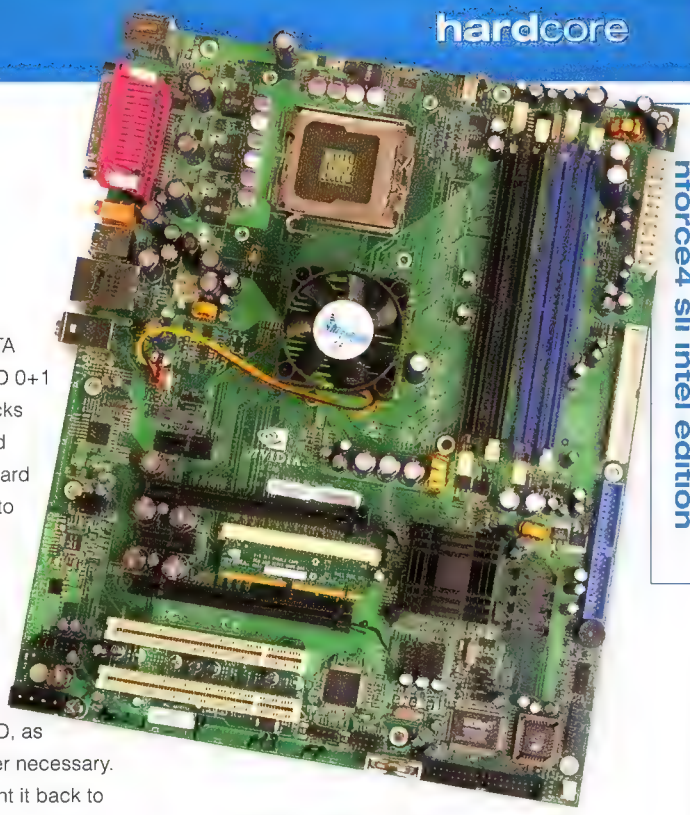
NVIDIA nForce4 SLI Intel Edition

Nathan Davis feels the crushing force of Intel and NVIDIA's lovechild.



specs

Price **$TBA**
Supplier **NVIDIA**
Website **www.nvidia.com**
Specifications **NVIDIA nForce 4 (Socket 775); SLI; four RAID 5 SATA ports; two Ultra ATA133 ports; four DDR2 DIMM slots; Gigabit Ethernet port; hardware-based firewall; Native Command Queuing; eight-channel AC'97.**

It's been a long time coming and finally NVIDIA have given life to the new 'Crush 19' chipset, which is now known as the wordy 'nForce4 SLI Intel Edition', giving Pentium owners an nForce alternative and bringing with it the steaming SLI capability.

NVIDIA has been particularly popular in the AMD paddock, with its nForce chip dominating the market for some time now. It has come a long way too, though recently the chip took a wildly confusing step backward by having the SoundStorm audio controller chomped out and replaced with a hugely disappointing AC'97 chip.

The AMD and Intel solution, when compared, are not all that different. The major changes are the creation of a memory controller and the obvious support of a different processor. There are also some interesting additions such as ActiveArmour, NVIDIA's newly CPU-independent firewall with a dedicated hardware engine for the integrated Gigabit Ethernet. The southbridge, known as the MCP (Media and Communications Processor), has had a face lift in the RAID department, with its four SATA ports now also sporting RAID 0+1 and RAID 5. It also now packs support for Native Command Queuing, which many new hard drives are beginning to use to speed access time.

The memory controller is found within the new northbridge, dubbed the System Platform Processor, or SPP. NVIDIA had phased the northbridge out with AMD, as its primary use was no longer necessary. However, NVIDIA has brought it back to support Intel's CPUs, due to their lack of an on-die memory controller – as is present on the Athlon 64 and FX-55.

As a result, the memory controller is where we were expecting to see a performance difference. Considering it's been developed by a third party, this is where a bottleneck can build up and where we expect NVIDIA focussed a lot of its resources.

NVIDIA designed the chipset to only support DDR2 memory and is made up of two independent 64-bit controllers that can operate as a 128-bit controller in 'ganged mode' (no, you dirty people, it's special-speak for dual-channel). It also supports up to 16GB of RAM by using 4GB non-ECC sticks in each of the DIMMS. Beastly, if you like having insane amounts of RAM – and who are we kidding?

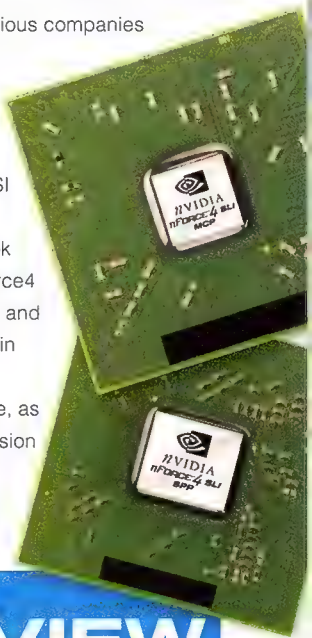
We tested with a Pentium 4 EE 3.73GHz, Athlon 64 3500+, two 512MB sticks of DDR2 675MHz, two 512MB sticks of DDR400 and two 6800 GTs running in SLI. Judging by the results, it's apparent AMD won't be giving away its trophy chipset with ease. Though the FX55 wasn't available, the 3500+ managed to keep up with the P4EE much of the time.

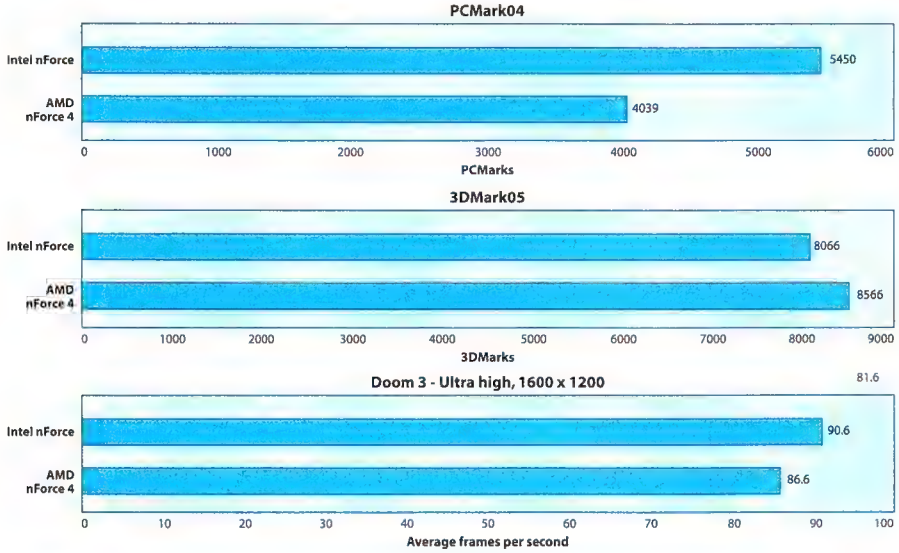
That said, it does pull away with some nice scores, though not as high as we've seen on Intel's own 925XE chipset.

It's a decent result, but the AC'97 audio partially douses the excitement factor. On the other hand some ingenious companies are coming up with methods to include slightly better chips, such as the Creative Live 7.1 chip on the MSI K8N Diamond mobo.

Next month, we'll look at some final retail nForce4 SLI Intel Edition mobos and see how they stack up in performance.

Features will likely be, as usual, the biggest decision maker in choosing one particular motherboard over another.





atomic PREVIEW

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Gigabyte G-Power Pro

specs

Price **$TBA**
Supplier **Synnex**
Website **www.synnex.com.au**
Specifications **Socket 478/A/939/754/775; nickel-coated copper core; four heatpipes; aluminium fins; 110mm 3200rpm fan; 430g.**

Reminiscent of the effective Thermalright XP-120 heatsink we looked at in *Issue 45*, Gigabyte's latest heatsink offering has four heatpipes protruding out from one side of the nickel-plated, copper core which is bent up and around to support the aluminium fins that hang above.

Lightweight at 430 grams and sporting four blue LED lights for added trippiness, this unit supports all the major platforms.

The issue that really stuck its smutty foot in our mouth was the noise that emanated from this epicentre of reverberation, no thanks to the ball bearing fan. Regardless of the speed we set it to – 3200rpm or its slowest spin speed of 1700rpm – it still managed noise almost on par with our oscillating Goldair Power 50 room fan set to 'super' speed. The fins and heatpipes seemed only to accentuate the noise.

With noise often comes performance and having clipped it on to Chernobyl fired to 80W, in a summery 28°C ambient temperature, it managed to keep the mercury at 41°C whilst pumping ear wax at 3200rpm. At a slightly less noisy 1700rpm it cooked up 6°C more to 47°C. Considering it's so loud, it should have outperformed the potentially quieter XP-120 (you choose your own 120mm fan), but it didn't.

Luckily this cooler isn't being pitched as a quiet cooler, but had it simply used a sleeved fan instead, it may have faired better. Alas for this heatsink, silent cooling is where the market is going now.

This is still an effective cooler, just not the best. If cooling performance is all you care about, this ogre is probably blaring your name.

ND

score 7.0 OUT OF 10

Thermaltake Sonic Tower

specs

Price **$65**
Supplier **Anyware**
Website **www.anyware.com.au**
Specifications **Socket 478/A/939/775; copper core; six heatpipes; 110 aluminium fins; no fan; 692g; 11.2 x 11.2 x 15cm.**

Thermaltake – developers of Plastinium, the relatively new element made up of a fusion of plastic and aluminium properties – have pushed yet another cooler through the production line. It's a massively large heatsink measuring 11.2cm squared across and 15cm tall. So it's big.

It has 55 aluminium cooling fins stacked on each of the two sides, with a total of six copper heatpipes leading out from the copper base up through these fins. This is a potentially highly efficient design. But that copper does make it a weighty unit, heaving in at almost 700 grams.

Instead of promising passive cooling, they vaguely referenced it by saying 'fanless & air cooling'. Whatever that means, it's a tad oxymoronic, yeah?

There are two options for the use of this unit and one is simply with an exhaust fan. The other is to whack a 120mm fan on the side. We have a hunch which will perform better.

For testing we stuck the behemoth on Chernobyl which, as usual, we fired it up at 80W.

In 25°C ambience, with a gentle breeze from a room fan, it peaked at 52°C. Nothing spectacular, but certainly not shabby for pseudo-passive cooling, loosely similar to having only an exhaust in the case.

So next we attached a silent 120mm fan. Spinning at 2000rpm, the temperature dropped to a mighty impressive 39°C. That blew us away.

Thermaltake have taken us by surprise and delivered an effective heatsink that we have no problems recommending for the silent cooling aficionados. Kudos to Thermaltake.

ND

score 9.5 OUT OF 10

Klipsch ProMedia GMX D-5.1

specs

Price **$490**
Supplier **Anyware**
Website **www.anyware.com.au**
Specifications **5 satsellites (0.75in and 3in drivers), 6.5in front firing woofer, 2 digital (coax, toslink) and 1 analog (stereo) inputs.**

The PC surround sound speaker market is a crowded one these days, with entries from market staples like Creative through to classic home theatre audiophilic behemoths like Klipsch. Unlike home theatre, PC speaker brands don't illicit the same dutiful donation to expensive names, and so 5.1 systems really have to offer something special to set themselves apart from the pack.

Klipsch doesn't quite do that here. In terms of sound quality, the experience behind Klipsch shows, with five carefully crafted satellites each utilising two drivers – a 0.75in metalised polymer tweeter paired with a 3in metalised fiber-composite for mid-range. The sound these satellites produce is, to be fair, better than pretty much anything else we've heard from a 5.1 system. And the stable table bases make positioning them a breeze.

The woofer uses a 6.5in front firing driver with a side ported enclosure. The bass is clear and not muddy like you often find with these kits. Where the ProMedia GMX D-5.1 speakers are let down is in the controller – this ugly, unwiedly, decoder is ostensibly designed to sit on the floor for consoles. And it lacks simple features like 5.1 analog inputs and a headphone jack if you wish to keep the noise to yourself (and play with mic-headphone sets).

If you're after one of sweetest sounding 5.1 kits available and don't mind the odd pancake controller, it could be a match made for you and your Xbox.

AM

score 7.5 OUT OF 10

Seagate 400GB Barracuda 7200.8

specs

Price **$539**
Supplier **Seagate**
Website **www.seagate.com**
Specifications **400GB SATA HDD; 8MB cache; 7200rpm; three platters; six heads; NCQ; five-year warranty.**

We may well never know the true meaning behind why hard drive manufacturers have chosen to go with naming their drives after fish and their slimy spawn. That said, a Barracuda is probably a good call for this beast, considering its ability to eat almost anything thrown at it.

Packing a whopping 400GB (or 376GB – see the intro to the Hardcore section. Now. No, really.), this is nevertheless a sneeze from being full. Jam-packed with readme.txt files or '575 exciting games' as the press release elegantly states. This drive consists of three platters storing 133GB each. Yes, that's 399GB. Someone get the broom.

Seagate was only too keen to demonstrate to us its innate ability to stack six of these bastards in a RAID 5 configuration (on some SATA RAID PCI controller) for two whole terabytes. Admittedly, this was somewhat arousing.

The standard cache size is the usual 8MB, however there is also a 16MB cache edition, though the performance benefits aren't immediately obvious for most general tasks.

As with all Seagate drives, it has Native Command Queuing support with a 32-command depth, lengthening the life of the drive and accessing the data quicker and quieter. Slapping her on the test bed, SiSoft Sandra 2005 showed she can whip up a respectable drive index of 59MB/s.

It's about 25 percent more per GB than other drives we've looked at, but considering its quiet level of operation (~25 acoustic decibels) and high performance, some things are worth paying that little bit extra for. If you dig wads of data, this is for you.

ND

score 8.5 OUT OF 10

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- Special Feature: I-Burn Technology, I.B.S Technology, VRS & Ultra quiet design, Low profile design

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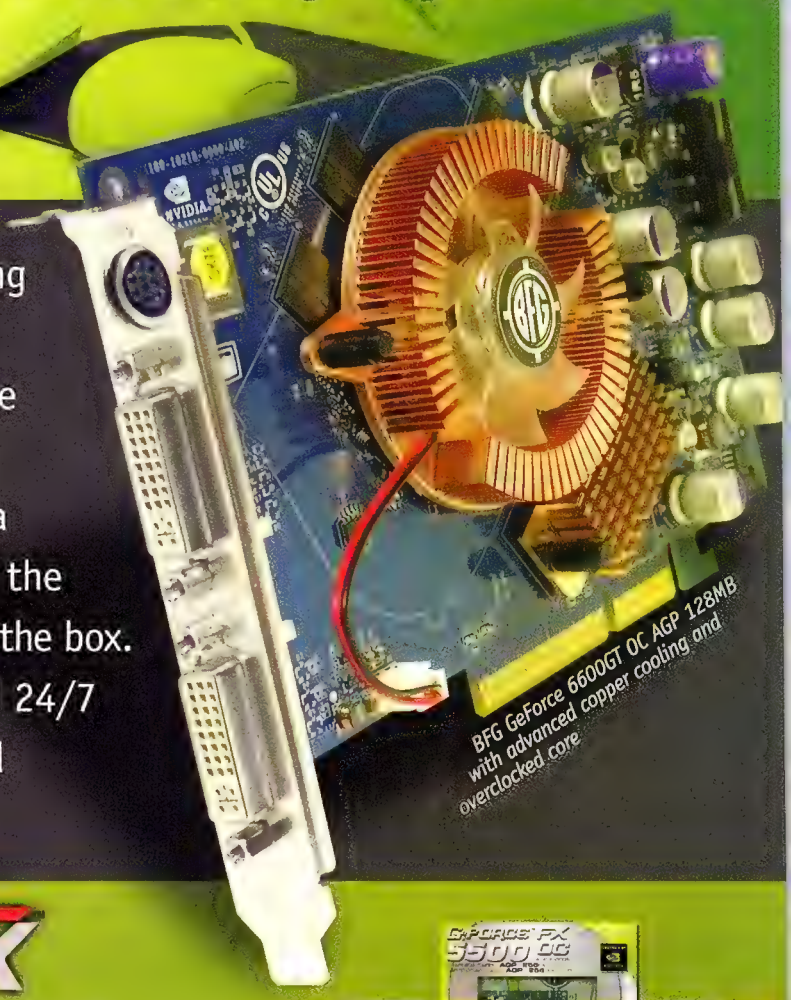

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Sony SDM-HS75P

specs

Price **$699**
Supplier **Sony**
Website **www.sony.com.au**
Specifications **17in LCD; 1280 x 1024; 8ms response; 0.264 dot pitch; 400cd/m2 brightness; 500:1 contrast ratio; 160° viewing angle.**

Tight-millisecond LCD monitors are essentially the norm in the enthusiast sector however a niggling problem since their incarnation has been severe colour issues. Many manufacturers have taken shortcuts, trying to be the first in the market with an 8ms LCD screen, but this came at a cost – colour dithering and poor phase control. These are problems that for the most part don't even exist in generic Joe Blow monitors.

Some manufacturers, thankfully, chose to wait and fix up any issues instead of rushing out the door and sucking the excitement out of an otherwise neat technology. Well this beauty is nothing short of well waited for.

With an intriguing 'J' shaped design, it's equipped with a stand at the back that has a nifty rubber roller for 20° of adjustment.

We were hard-pressed to find anything wrong with it. Thanks to the fast response time, there's no noticeable ghosting of the image.

In addition, it's exceptionally bright, has perfect phase control and a colour depth that is among the best that's hit the Labs.

Aesthetically, the menu buttons could have been placed in an easier to reach location, but the operation of this baby is otherwise flawless. Popping on our uber-picky caps, the backlight fades off a tad prematurely at the top, but this is barely noticeable with the eye candy it cooks up.

Sony is infamous for scorching prices, but that seems to have changed here. This is a damn astounding unit and if you're looking at grabbing a decent 17inch LCD, it comes highly recommended.

ND

score **9.5** OUT OF 10

Soltek Qbic EQ3901-300P

specs

Price **$569**
Supplier **SATO**
Website **www.satotech.com.au**
Specifications **VIA K8T880 Pro; 4 x drive bays; AGP slot; PCI slot; 2 x SATA; 2 x PATA; Gigabit Ethernet; eight-channel AC'97; 300W PSU.**

In a market largely dominated by one manufacturer, it's understandably difficult for others to break into it. Finally, however, we're starting to see some decent competition and it's generally worth a peek outside.

Highly reminiscent of a radio box from the 50s, this small barebones system isn't the smallest we've seen. Looking rather retro on the outside, it'd look great stuck on the back of Fonzie's Harley Knucklehead. Naturally, whether or not this is you is highly subjective.

Inside is slightly more recent technology with a VIA K8T880 Pro motherboard sporting two dual-channel DDR DIMM slots and two SATA ports. There is also a floppy and two PATA ports, so there's ample expansion for the two 3.5in and 5.25in drive bays.

For cooling, Soltek has opted for a standard desktop heatsink unit, which is conveniently included. Heat extraction is performed via two exhaust fans, one which sucks air out from the AGP and PCI slot-side of the heatsink and shoots it out the back, and the other at the base of the PSU. Surprisingly quiet for three fans.

Fitting the heatsink and removing/attaching the top cover are a bit fiddly. Apart from that, it's what's to be expected from a SBB system.

Fiddly for unco hands, but once it's together and functioning, it's a fully capable box, albeit without onboard video. If you can appreciate the appearance of this unit, chuck one of these in your lounge and you'll have a sturdy foundation for a 50s-esque home theatre system.

ND

score **7.5** OUT OF 10

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hardcore hardware

When lust for the latest gear turns into a finely tuned plan to upgrade, it's time to sell your grandma and get dirty with your PC. But which components are worthy of your hard earned cash? Bennett Ring rounds up the current market and puts it all on test.

One of the best things about being a PC owner is the *ability* to upgrade as we see fit. One of the worst things about being a PC owner, at least for people like us, is the *need* to upgrade. It's a double-edged, +21 Blade of Doom – on the one hand it allows us to keep light years ahead of those kiddy consolers and always have a machine that is perched on the bleeding edge of technology. But on the other hand it can cost upwards of a grand a year to keep a PC that is up to speed and able to run the latest, most demanding workhorse applications (aka *games*).

But if you know when to upgrade, and how to upgrade smartly, it needn't be a fiscally challenging time.

Beyond the hype

The most obvious thing to keep in mind is to take the marketing hype with a grain of salt. Some would have you believe that every single product brought to the market makes your existing hardware a bagillion times more powerful, while using a tenth of the juice. Just wait for the advertising blitz that will accompany the new dual-core CPUs if you don't believe us. These chips are already being hyped as jet-speed, number-obliterating processing behemoths, yet for many of the most demanding tasks the first batch of these new chips will actually be slower than the existing generation of single-core CPUs.

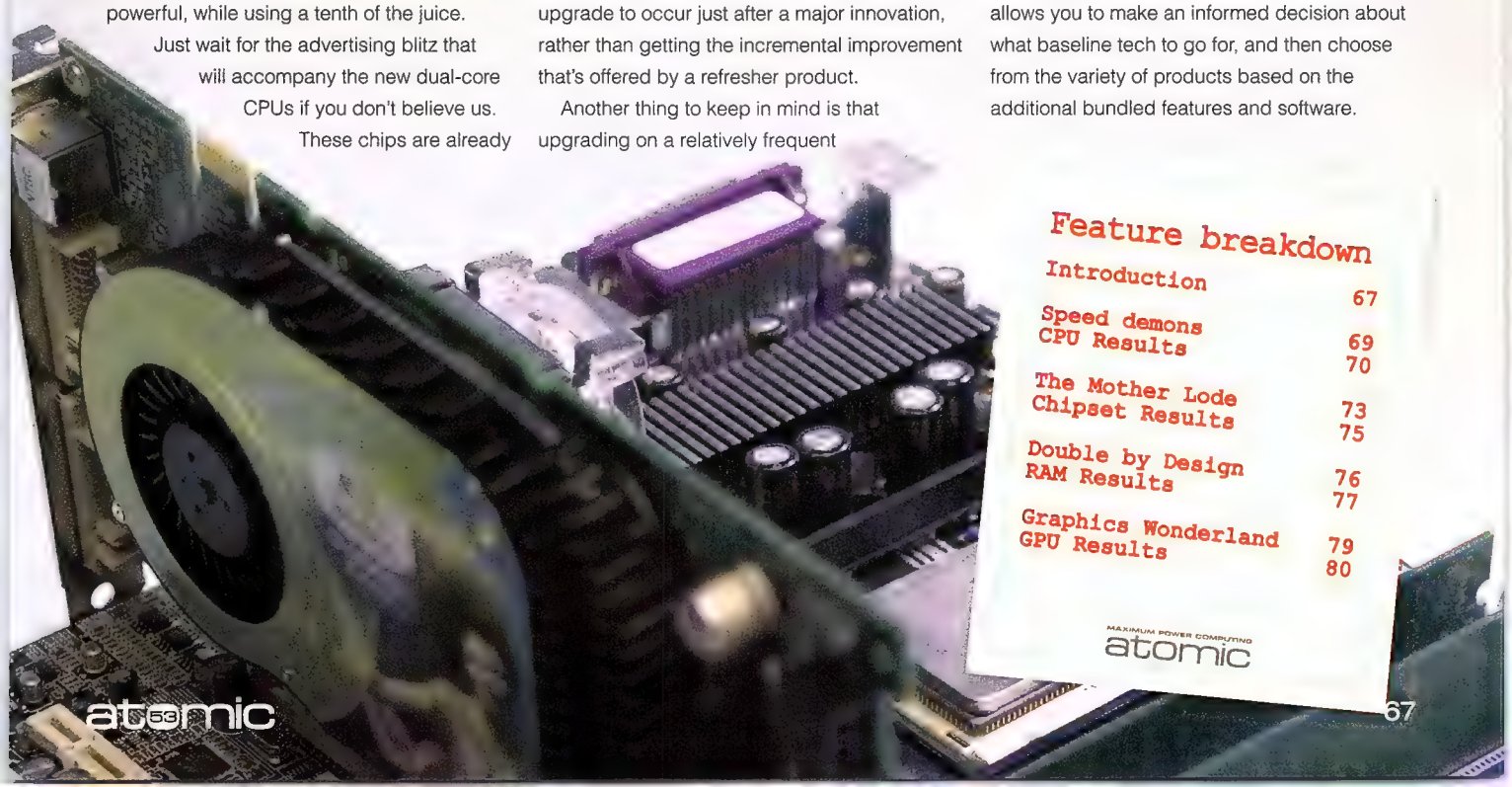
The key to cutting through these mounds of overblown claims is to wait until a product hits. Then do a little research, be it via your favourite computing enthusiast mag (of course) or via some of the (few) reputable online review sites. Only then will you know if a component is as truly revolutionary as its makers claim. Or more importantly, if it's something for you.

If you keep an eye on hardware developments, you'll notice that each component tends to follow a fixed cycle, where everything happens on a predictable schedule. And funnily enough, each of the competing manufacturers of these components will just happen to bring its latest tech to market at the same time as its competitors. In between these major product releases will be refreshes of the last major innovation. So it's best to time your upgrade to occur just after a major innovation, rather than getting the incremental improvement that's offered by a refresher product.

Another thing to keep in mind is that upgrading on a relatively frequent basis, say, every 12 months, can actually cost you less in the long run than upgrading every couple of years. If you do upgrade regularly, it's possible to sell off your older parts at a decent price, before they're only good for building an MP3 box running Linux.

Lastly, it needs to be said that with the rapid development of technology there will always be a newer, better upgrade around the corner. In the next couple of months we'll see brand new architectures from NVIDIA, ATI, Intel and AMD. And if we waited for those technologies to hit, there would be something else on the horizon. The key is to upgrade at the right time and accept that you'll have to do so again in the future.

Here to help you is the *Atomic* upgrade guide, your handbook for the latest gear to help your PC rise from the ashes of obsolescence. Note that because of the huge variety of products available we decided to test the underlying chipsets that power them when it came to motherboards and video cards. This allows you to make an informed decision about what baseline tech to go for, and then choose from the variety of products based on the additional bundled features and software.



Feature breakdown

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ECS ELITEGROUP

Simply Smart

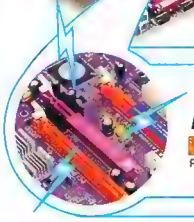
One board fits all

Computex Taipei 2005
May 31st - Jun.4th
Visit us at Hall 2, Booth No. F239 ~ F242

PF88 EXTREME Hybrid

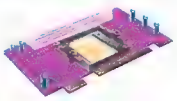
Dual Core | 64 bit support | SERIAL ATA 3Gb/s | Dual Channel | IOC Instant Overclocking Controller

■ Are CPU and memory type your concerns when purchasing a motherboard? With ECS's innovative PF88 it's no problem at all: The innovative PF88 motherboard with patented EliteBus design -- plus all the latest advanced technology -- lets you utilize the features of AMD K8 architecture on an Intel LGA775 platform with a SIMA card inserted.

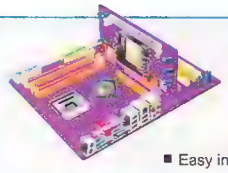


EliteBus S Platform converter

■ This unique slot is designed to accommodate SIMA card With EliteBus, users can now enjoy both Intel and AMD technology on one motherboard plus simultaneously experience desktop and mobile CPUs on a single motherboard



■ SIMA card (platform converter card)



■ Easy installation

ECS motherboard awards:

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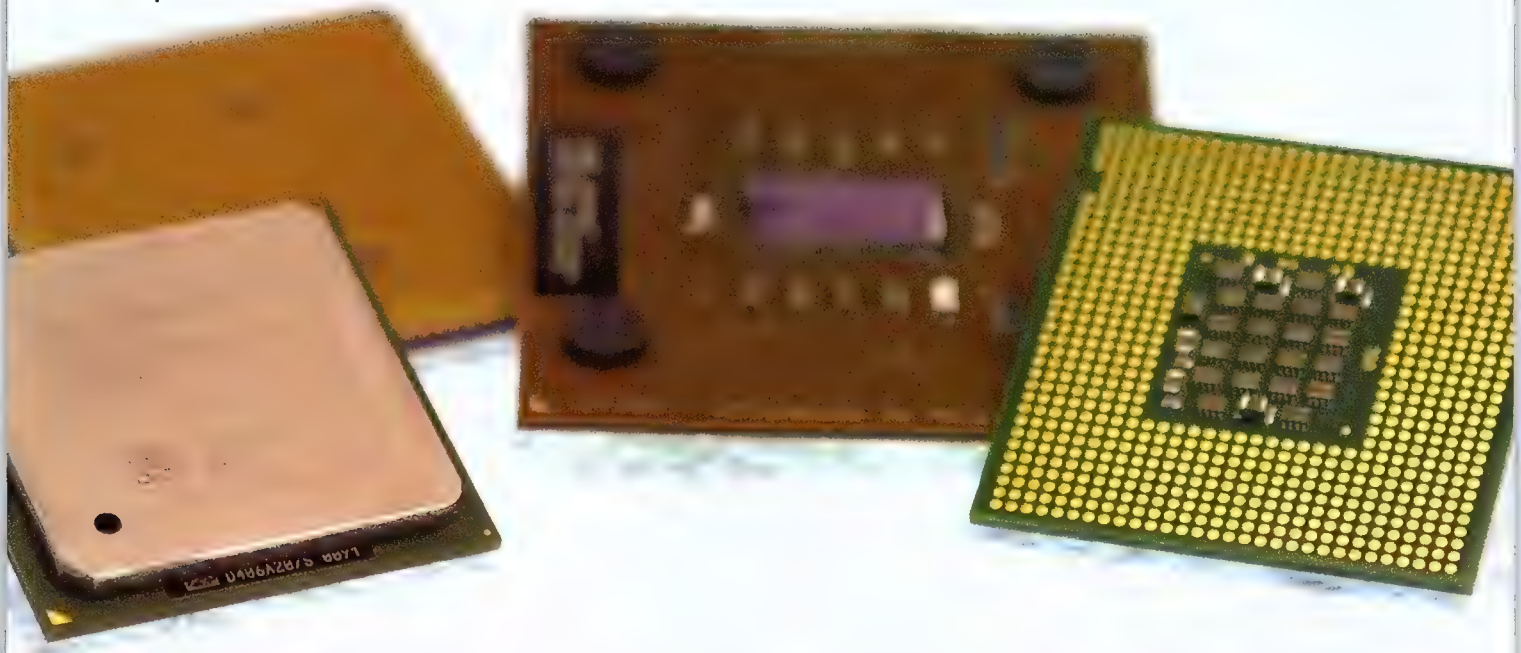

The CPU scene

Over the last eighteen months the decision to upgrade your system CPU has been a no-brainer – if you had anything over 2.5GHz or so, you'd be better off booking a trip to Bali rather than buying a new processor. You can thank the silicon gremlins that struck both Intel and AMD for this – CPU frequency growth slowed to a grinding halt over this period. Newer, faster CPUs continued to be released, but the frequency increases were incremental at best, unnoticeable at worst. So there was simply no need to upgrade if you had anything half-decent.

However, things got a little more complicated when Intel and AMD both introduced new Socket designs. Socket 939 was introduced for the Athlon 64, while LGA 775 made for a whole new platform for Intel users. Therefore, if you're going to upgrade with an eye on future upgrades, it's wise to go for a motherboard/CPU combination that uses one of these newer Socket designs. It's still possible to stick with the older sockets (Socket 754 for AMD, Socket 478 for Intel), but you'll find that your future CPU options will be severely limited. And if you have a CPU in the range of 3GHz or so, it's still not worth upgrading just yet. Even if you're prepared to fork out for the fastest chips in both Intel's and AMD's product catalogues, which will set you back a pretty penny to say the least, you're only going to notice a 30 percent speed increase at best – and this will only occur under the most extreme, CPU-bottlenecked circumstances. The vast majority of today's games all run very well on a 3GHz chip, with performance limitations usually being tied to the video subsystem rather than the processor.

However, things are about to get a little confusing with the imminent introduction of dual-core CPUs from both of the major chip makers. Bear in mind that these chips will give no noticeable performance improvement while playing games. It's only when running multi-threaded software, or when multi-tasking, that these dual-cores will show their true, dazzling potential. Due to the fact that the individual cores in the initial batch of dual-core chips will run at a lower frequency than the single-core chips we have today, they'll usually be slower at running your games.

Therefore gamers are advised to hold off on making the switch to dual-core CPUs until the frequency of the cores within these double-headed beasts equal that of our single-cored CPUs. The introduction of games that make the most of multi-threading will bring forth a massive performance increase, but these titles aren't due anytime soon. In fact, we can't even think of a single game in development that has been slated as taking advantage of multi-threading.

If you do feel the urge to upgrade to a platform that will be able to host these dual-core chips, AMD has a massive advantage over Intel. This is because existing Socket 939 motherboards should be able to run these chips with a mere BIOS flash, while Intel users will need an entirely new chipset. Once again it appears that AMD has developed a roadmap that keeps its punters happy, with a simple and cheap upgrade path, while Intel has yet again wiped the slate and introduced an entirely new platform.

This fact alone makes the decision about which CPU to upgrade to rather simple. Combine this with the Athlon 64's ability to run games more speedily than the Pentium 4, and it's pretty easy to see why we recommend going AMD for your future upgrade.

But until these new chips arrive, we're stuck with what's on the market now. Let's take a look at how the crop of today's existing CPUs stack up against each other.

HOW WE TESTED: CPUs

Given the need for a variety of Intel and NVIDIA motherboard chipsets (and sockets – see the motherboard chipset comparison on page 73) required to test the different processors this round-up is as much a platform comparison as it is CPU. Still, where possible the remaining components were swapped between our selection of testbench motherboards in Labs. We used Futuremark's PCMark04 and FarCry in addition to 3DMark2001 SE and 3DMark03 to stress test the processors to their limits and reveal performance differences.

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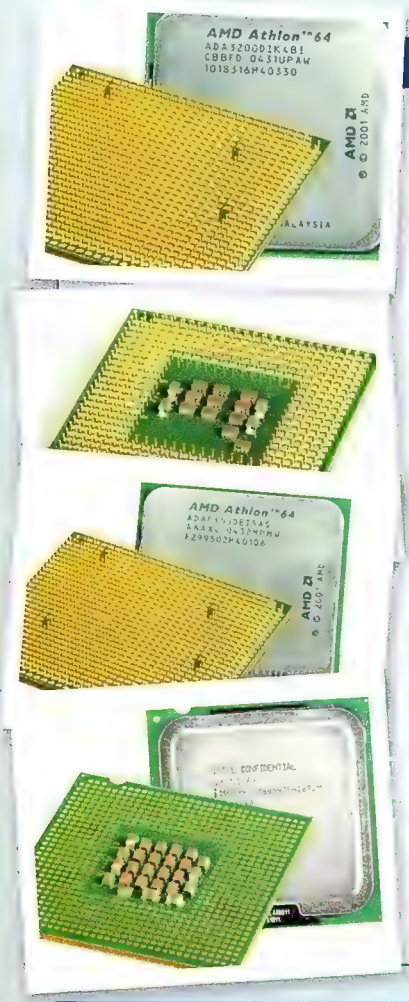


PERFORMANCE ANALYSIS CPUS

AMD Athlon 64 3200+

Considering this chip can be picked up for a mere $200 or so, it's quite the powerhouse when it comes to games. It doesn't lag far behind the high end chips either, as our benchmarks proved.

AMD traditionally don't do too well in PCMark04, as Intel's HyperThreading abilities really shine in this benchmark. So it's no surprise to see that the 3200+ even lagged behind the lowly 2.8GHz Prescott Pentium 4. However, the picture changes when it comes to gaming performance, with the 3200+ solidly beating the slower Pentium 4 in every gaming based benchmark. The biggest difference between it and the Pentium 4 was in FarCry, where the 3200+ was around 25 percent faster than Intel's offering.

Even though it was squarely beaten by the high end chips in 3DMark2001 SE, look to the 3DMark03 and FarCry results to see how closely this chip runs to the big boys in today's games, where the video subsystem is more of a stumbling block. For only $200, you can't really go wrong with the Athlon 64 3200+, as it provides more than enough grunt to run today's games with ease.

Intel Prescott 2.8GHz

It's hard to believe that you can now pick up a 2.8GHz CPU for less than $150. You could say that CPUs are now cheap as chips. Nyuk nyuk. Considering this processor should quite happily overclock to 3.3GHz, provided you don't mind doing some tweaking, it's amazing just how rapidly CPUs have become one of the cheapest parts of your PC.

But if you're not comfortable overclocking, this Socket 478 CPU won't offer blinding performance. As expected, it pipped the Athlon 64 3200+ in the productivity application based PCMark04, but it lagged behind in all of the gaming based benchmarks. It managed to keep fairly close to the 3200+ in the heavily GPU-dependent 3DMark03, but the real failings of this chip were displayed in FarCry, where it lagged behind by around 25 percent.

If you don't mind heading into the BIOS to change a couple of settings, the 2.8GHz Pentium 4 could provide a nice performance boost for owners of older Socket 478 boards running CPUs in the 2GHz range. But if you're looking to upgrade with the future in mind, it's worth spending an extra $50 for the 3200+.

AMD Athlon FX-55

While it's one of the fastest chips on the market, the FX-55 is a great example of why it's not worth spending a massive amount on your CPU. If you can find one in stock, expect to pay upwards of $1100 or so for AMD's flagship gaming CPU. For this price you'd be forgiven for expecting a massive leap in performance, but as our benchmarks show this isn't the case.

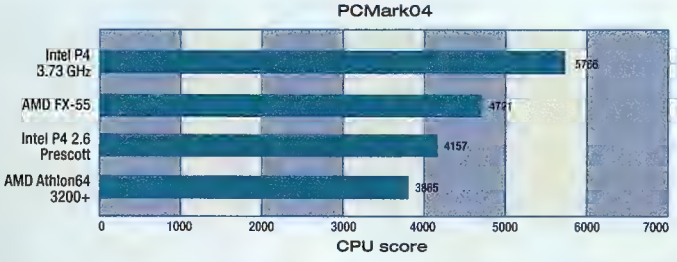
It lags far behind the 3.73GHz Pentium 4 in PCMark04, but to be honest we're not too concerned if a Word document takes 0.7 seconds to open rather than 0.5. Things are neck and neck between the two in 3DMark2001 SE, while the FX-55 lags behind a little in 3DMark03. It had a slight lead over the 3.73GHz Pentium 4 in FarCry, but not enough that you'd actually notice it while playing the game, unless you were Rain Man.

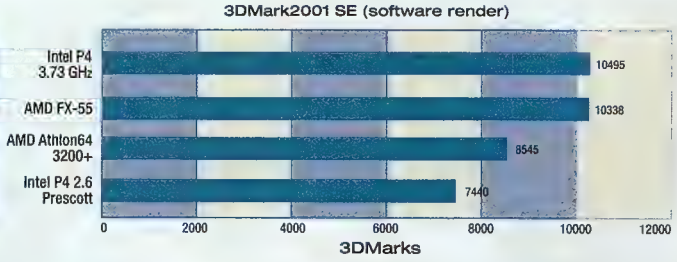
The fact that it's not that much faster than the 3200+ in game performance means we can't justify the six fold increase in price of the FX-55. Definitely a CPU for those with more dollars than sense.

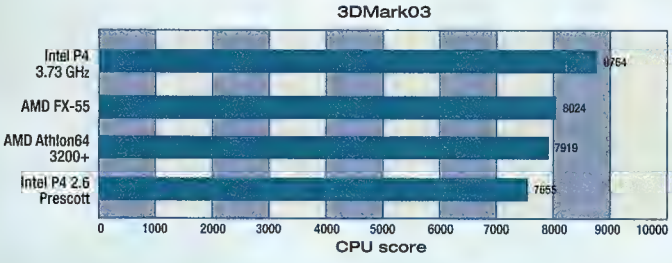
Intel Pentium 4 Extreme Edition 3.73GHz

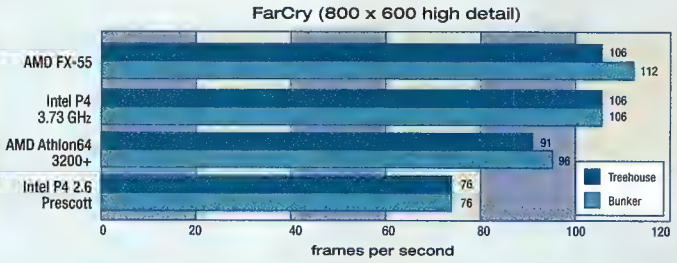
Just when you thought the FX-55 was ridiculously expensive, along comes the Extreme Edition. Sure, it runs at a super fast frequency (just think, 4GHz could be yours with a tiny bit of tweaking!) and a whopping 2MB of cache, but this comes at a price. Over $1500 in fact for most retailers. And once again the lowly $200 3200+ gives this chip a good run for its buckets of money. If all you're worried about is your productivity applications running well, then by all means, spend as much on this one CPU as many people spend on their entire system. And there's no denying that its HyperThreading feature makes for excellent responsiveness when it comes to multi-tasking. But for those of us who don't have a couple of million in the bank, the Extreme Edition is an extreme waste of money.

Product details	AMD Athlon 64 3200+	AMD Athlon 64 FX-55	Intel P4 2.8GHz Prescott	Intel P4 3.73GHz EE
Average price (inc GST)	$379	$1669	$239	$1694
Basic specifications				
CPU socket	939	939	478	LGA-775
Clock speed	2.0GHz	2.6GHz	2.8GHz	3.73GHz
System FSB	2000MHz	2000MHz	800MHz	1066MHz
Memory supported	DDR	DDR	DDR	DDR2
Supported architecture	32/64-bit	32/64-bit	32-bit	32/64-bit
L2/L3 cache	512KB	1MB	1MB	2MB









Albatron

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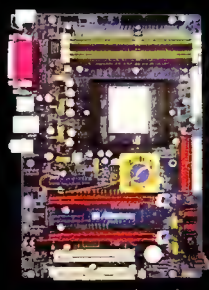
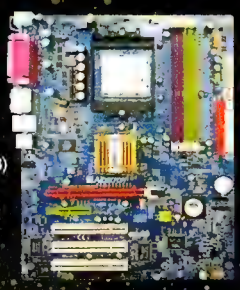


K8SLI

Nvidia nForce4 SLI chipset

- Supports Socket 939 AMD Athlon™ 64 / FX Processors
- FSB 1000+ MHz
- Supports Dual Channel DDR 400+ Memory up to 4 GB
- Supports 2 * PCI-Express x16 (Nvidia SLI Technology Support, x8+x8)
- Supports 4 * ATA133, 4 * Serial ATAII
- Built-in Nvidia 10 / 100 / 1000Base -T LAN with Hardware Firewall
- Built-in 6-Channel Audio (AC'97), S/PDIF
- Supports 8 * USB2.0
- Supports Nvidia RAID 0, 1, 0+1, SATA+PATA RAID
- ABS (optional)
- Chipset Supports HyperTransport™ Technology
- Supports Cool'n'Quiet
- Jumper Free Design
- Watch Dog Timer

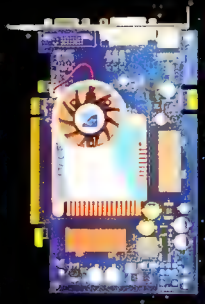


K8X890 Proll

VIA K8T890 + 8237R chipset

- Supports Socket 939 AMD Athlon™64/FX Processors FSB 1000+ MHz
- Supports Dual Channel DDR 400+ Memory up to 4 GB
- Supports PCI-Express x 16 Graphics
- Supports 4*ATA133, 2*Serial ATAII
- Built-in Marvell 10 / 100 / 1000 Mbps LAN
- Built-in VIA Envy24PT 8-Channel Audio, S/PDIF
- Supports 8*USB2.0
- mPower (4th-Phase PWM Support)
- Supports 2*IEEE139a
- Supports RAID 0, 1, JBOD
- Chipset Supports HyperTransport™ Technology
- Supports Fixing PCI / AGP Frequency at 33 / 66 MHz
- Supports Cool'nQuiet
- Jumper Free Design
- Watch Dog Timer / OTP

PERFORMANCE



PC6600GT

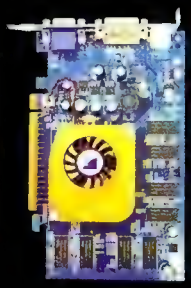
- NVIDIA® GeForce™ 6600GT GPU (Clock 500MHz)
- Superscalar 8-pipe GPU Architecture
- 128 MB, 128-bit DDR 3 Memory
- Innovation PCI Express with D-Sub / TV-Out / DVI ports
- CineFX™ 3.0 engine supports Microsoft® DirectX® 9.0c Shader Model 3.0
- Supports Intellisample™ 3.0, UltraShadow™ II, HPDR, Digital Vibrance Control™ 3.0 multi-display technologies
- Supports SLI technologies
- Bundled DVD Player software and PC games

AGP6600GT

- NVIDIA® GeForce™ 6600GT GPU (Clock 500MHz)
- Superscalar 8-pipe GPU Architecture
- 128 MB, 128-bit DDR 3 Memory
- AGP 8X with D-Sub, TV-Out, DVI ports
- CineFX™ 3.0 engine supports Microsoft® DirectX® 9.0c Shader Model 3.0
- Supports Intellisample™ 3.0, UltraShadow™ II, HPD Digital Vibrance Control™ 3.0 multi-display technologies
- Bundled DVD Player software and PC games

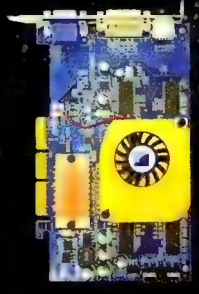
DVI nVIEW TV-OUT AGP 8X

GAMING PRO



PC6600Q

- NVIDIA® GeForce™ 6600 GPU (Clock 300MHz)
- Superscalar 8-pipe GPU Architecture
- 256MB,128-bit DDR Memory
- Innovation PCI Express with TV-Out/ D-Sub/ DVI ports
- CineFX™ 3.0 engine supports Microsoft® DirectX® 9.0c with Shader Model 3.0
- Supports Intellisample™ 3.0, UltraShadow™ II, HPDR, Digital Vibrance Control™ 3.0 multi-display technologies
- Bundled PC games



AGP6600Q

- NVIDIA® GeForce™ 6600 GPU (Clock 300MHz)
- 256MB,128-bit DDR Memory
- Superscalar 8-pipe GPU Architecture
- AGP 8X with TV-Out/ D-Sub/ DVI ports
- CineFX™ 3.0 engine supports Microsoft® DirectX® 9.0c with Shader Model 3.0
- Supports Intellisample™ 3.0, UltraShadow™ II

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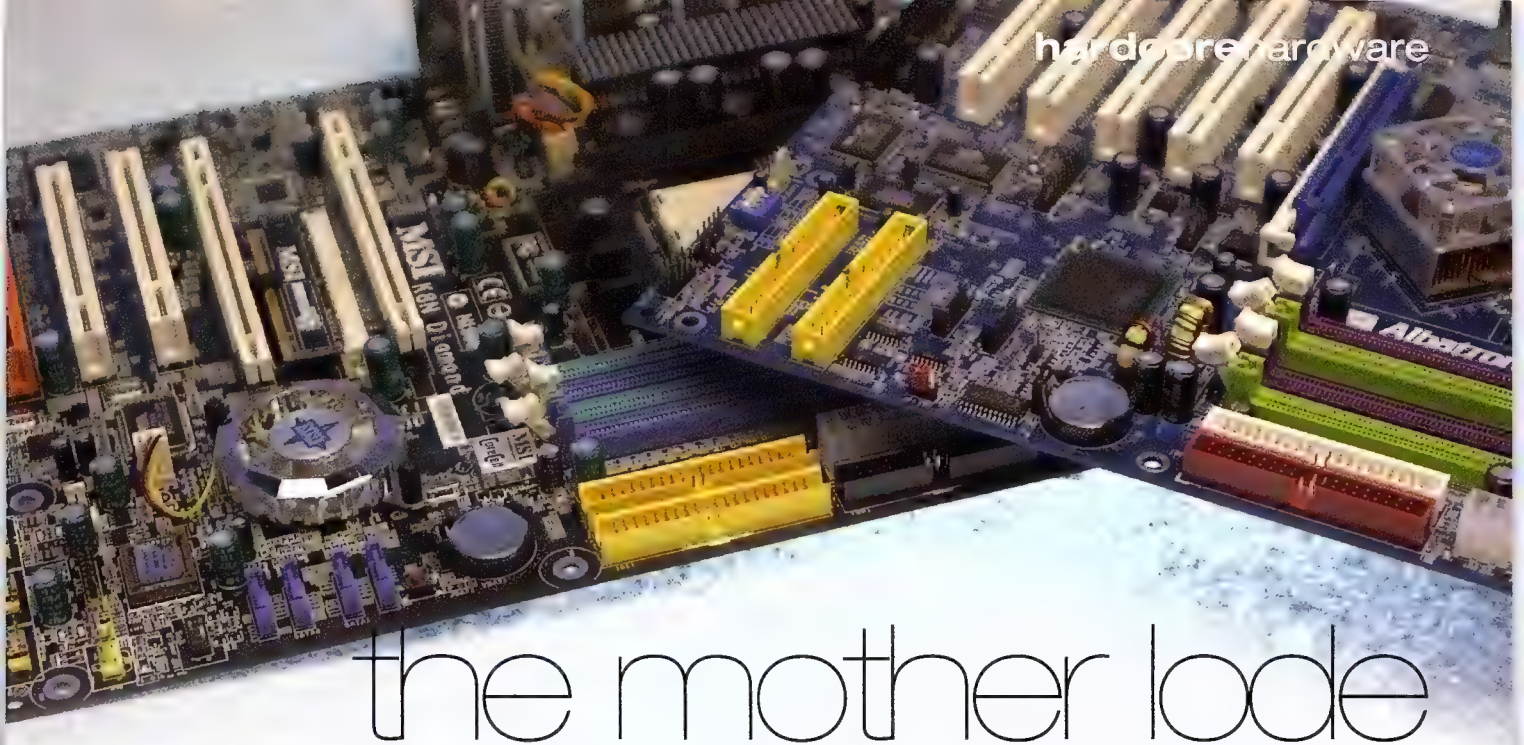

the mother lode

A tale of two sockets

The most important component when upgrading is, of course, the motherboard. As the foundation of your system it's worth putting some thought into which board to get. The choice of motherboard will determine what CPUs you can use, the memory type, as well as the video card. It also happens to be one of the more confusing areas, as the chipsets in use all tend to have rather cryptic, non-descriptive titles. Add to this the fact that there are several chipset manufacturers rather than two major players like the other components, and it ends up being a tricky proposition.

The most obvious factor when choosing a motherboard is which processor to use – AMD or Intel. Regardless on what you decide on, if you're looking for a new motherboard it's prudent to go for the variant that supports the latest socket design. For AMD users, this is the Socket 939 format, while Intel users will need a board which supports LGA 775. If you decide to go for a cheaper, older board that uses an older socket design, you'll be severely limited as to what CPUs you'll be able to use in future.

The other major decision to make when purchasing a motherboard is whether or not to take the PCI Express route. Thankfully PCI Express has matured to the point where it's not a great deal more expensive than the older AGP/PCI platform. PCI-E is definitely recommended if you're looking to upgrade your video card at the same time, as it's currently the slot of choice for video card manufacturers. The final major decision to make when upgrading your mobo is whether or not to go for DDR2. Thankfully this choice has been made for us on most motherboards; if you're getting a PCI Express board, chances are that it uses DDR2. And just like the video card and CPU support, it's wise to go for the newer option of DDR2, as this will provide more headroom when upgrading in future.

While there are several chipset manufacturers, the big two are still Intel and NVIDIA. ATI is making some headway into the market, but is still an unproven entity. When it comes to Intel chipsets, the latest include the 915 and 925 series. Like the previous generation of Intel chipsets, the 925 is only an incremental improvement over the 915, and in most cases you'll find performance to be almost identical between the two.

For AMD users, the platform of choice is the new NVIDIA nForce 4 chipset. This is available in three different flavours, the vanilla nForce 4, the nForce 4 Ultra and the most intriguing of all, the SLI. In case you've been living in outer Mongolia, the SLI mode is designed with the hardcore, filthy rich gamer in mind, as it includes two graphics card slots, allowing you to run two NVIDIA cards on the one board. While it doesn't provide twice the performance, it's still unmatched by a single card solution.

As mentioned in the CPU section, AMD boards have one major benefit over Intel boards. When AMD releases its dual-core CPUs later in the year, it will only take a mere BIOS flash for existing Socket 939 boards to be compatible with these new chips. However, Intel users are up that brown creek with only a chopstick as a paddle, as an entirely new chipset is required (the 955X) to support its multi-core processors. As a result it makes the decision about which platform to upgrade to heavily in AMD's favour. To see how it all stacks up, we took a look at four of the most popular chipsets in use today, and the ones best suited as a base for your new or upgraded system.

Chipset	CPU socket	Memory support	Memory speed	Effective FSB speed	Avg. price
Intel 925X	LGA775	DDR2	533MHz	800MHz	$350
Intel 915	LGA775	DDR2	533MHz	800MHz	$250
nForce 3-250 U	Socket 754	DDR	400MHz	1600MHz	$150
nForce 4	Socket 939	DDR	400MHz	2000MHz	$250

HOW WE TESTED: Motherboards

Using reference boards as a base, we used a variety of components to test:

Intel 925X – Intel 3.6GHz, 2 x 512MB DDR2 533, GeForce 6800 Ultra PCI-E
Intel 915G – Intel 3.6GHz, 2 x 512MB DDR2 533, GeForce 6800 Ultra PCI-E
nForce 3-250 Ultra – AMD FX-53, 2 x 512MB DDR2 533, GeForce 6800 Ultra AGP
nForce 4 – AMD FX-55, 2 x PC3200 DDR, GeForce 6800 Ultra PCI-E

A Seagate SATA 120GB hard drive was also used, as well as a fresh installation of Windows XP Pro. All motherboard BIOS settings were set to optimised defaults. When testing these boards we used a selection of benchmarks based on real world games including Quake 3 Arena and UT2003. Lower resolutions and GPU dependent settings were disabled in order to put as much strain on the motherboard as possible.

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SLI function fully support

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WinFast PX6600 TD
128 MB / 256 MB DDR
D-Sub + HDTV out + DVI-I

Performance level best choice

NVIDIA. HDTV

AGP 8X

WinFast A6600 GT TDH
128 MB DDR3
D-Sub + HDTV out + DVI-I

Best Price / Performance Choice on AGP 8X

NVIDIA. HDTV DDR3

WinFast A6600 TD
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D-Sub + HDTV out + DVI-I

Best replacement for FX5700 Series

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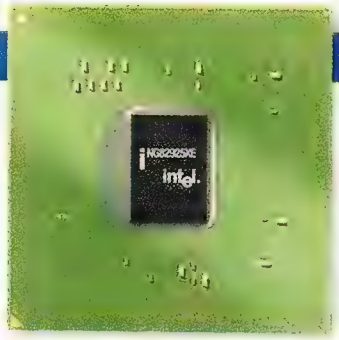
PERFORMANCE ANALYSIS CHIPSETS

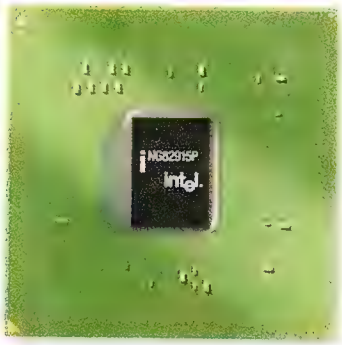


Intel 925X

Intel's flagship chipset, the 925X is designed with the performance user in mind. It supports the LGA 775 socket, DDR2 and PCI Express. The XE variant supports the 1066MHz frontside bus, while the 925X is basically identical but with an 800MHz frontside bus. It would appear that the faster 1066MHz bus would be a match made in heaven for the DDR2 533MHz memory supported by this chipset, but benchmarks prove that there is almost no performance increase between the X and XE.

A standout feature of this chipset is the onboard audio, in the form of Intel's High Definition Audio solution. This Dolby certified solution offers 7.1 surround sound at 192kHz/32-bit quality. Compare this to the older AC'97's support for six channels at 48kHz/20-bit and it's obvious how superior the new High Definition solution is. It doesn't just look good on paper – the difference is immediately obvious when listening to the two audio solutions.

The 925X also supports Intel's new 64-bit chips, allowing you to use more than 4GB of memory, while four SATA 150 ports provide plenty of room for hard drives. Eight USB 2.0 ports are supplied for connectivity, and obviously HyperThreading is also supported.



Intel 915

The 915 chipset is to the 925 as the 865 was to the 875. In other words, smart buyers will go for this cheaper variant, as it includes almost identical functionality with minimal performance loss. The major difference is the lack of PAT-like memory tweaks that exist in the 925X, but it doesn't seem to amount to much when it comes to real world performance.

Like its bigger brother, the 915 chipset also supports Intel's excellent new High Definition Audio solution. This is a major buying point when compared to NVIDIA boards, especially considering nForce has moved backwards to an inferior onboard audio solution.

It also supports LGA 755, PCI Express and DDR2, so it's no slouch when taking the future into account. Now if it only supported the upcoming dual-core CPUs coming from Intel, it might actually be worth upgrading to.

nForce 3-250 Ultra

If you have plenty of decent parts left over from your old AMD system, such as an AGP video card and Socket 754 processor, the best chipset available to take these components is the nForce 3-250 Ultra.

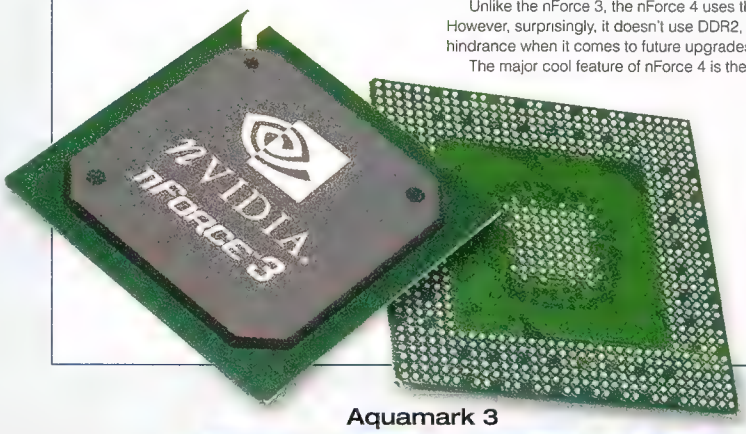
It's basically everything the nForce 3-150 should have been. If you're looking for the fastest Socket 754/AGP/DDR motherboard for your Athlon 64, it doesn't get much better than this. Unfortunately it's still lacking the SoundStorm audio solution that made the earlier nForce boards so desirable.

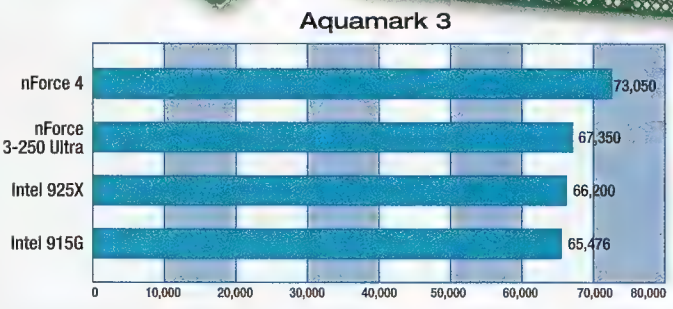
nForce 4

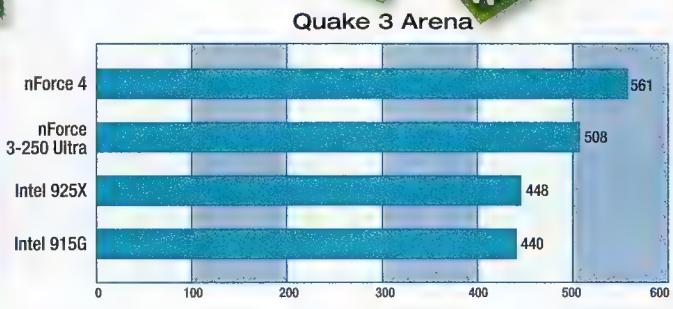
This is the latest NVIDIA-built bad boy to support the Athlon 64. As we've seen in previous AMD chipsets, NVIDIA once again retains the performance lead for the Athlon 64, although ATI's new chipsets are nipping at its heels.

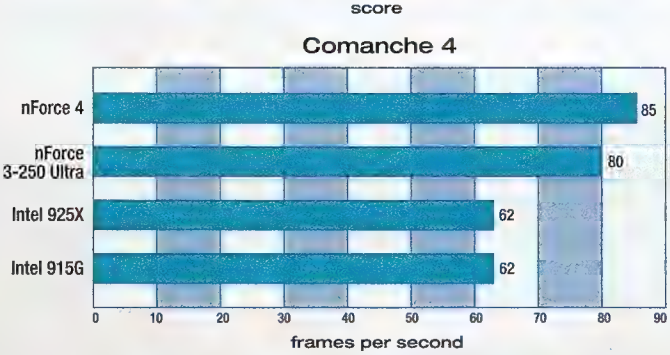
Unlike the nForce 3, the nForce 4 uses the next generation of motherboard technologies, namely Socket 939 and PCI Express. However, surprisingly, it doesn't use DDR2, instead falling back on proven DDR technology. Unfortunately this could prove to be a hindrance when it comes to future upgrades.

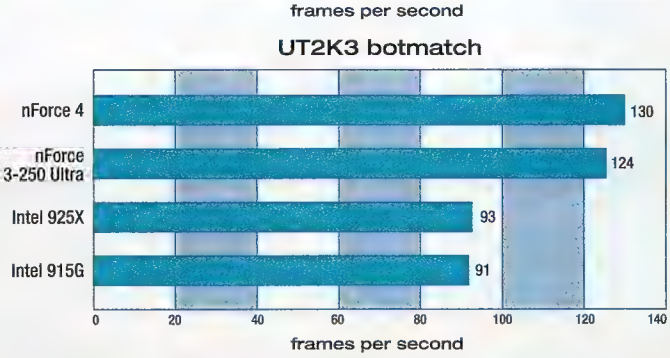
The major cool feature of nForce 4 is the SLI version, supporting two video cards. Well, it's cool if you can afford it.

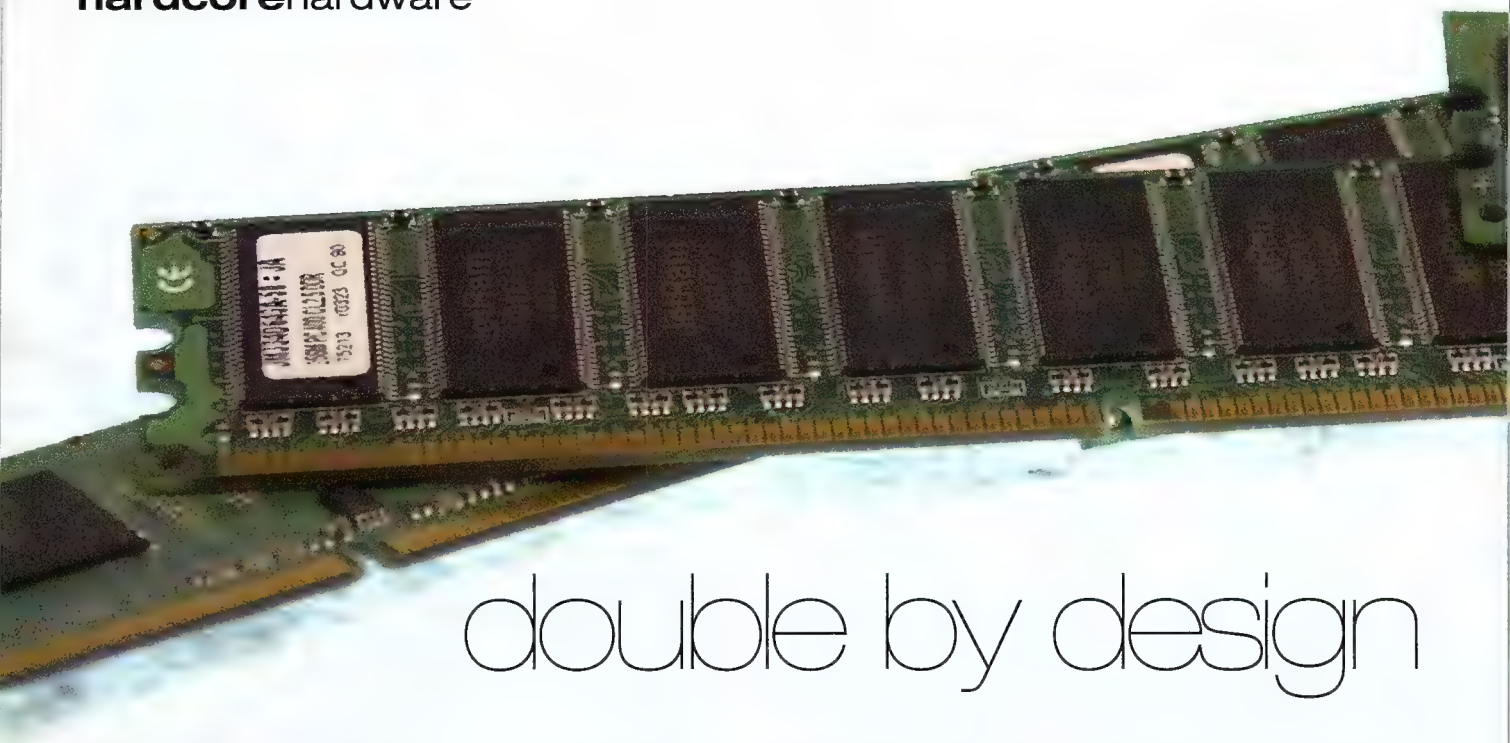












double by design

The matter of memory

As a basic rule of thumb, when it comes to PC memory, the brand and speed tends to be less important than the overall amount of memory used within your machine. For most users, 512MB is sufficient for day-to-day PC tasks. However, if the main use of your PC is for gaming, then 1GB is the optimal level of memory. For now, at least.

Compared to gamers, graphic designers, 3D modellers and those working with digital video will want as much memory as their meagre wages will allow. This is one of the only current benefits of owning a 64-bit system, as these machines can address over 4GB of memory.

There are two main types of memory in use on today's desktop PCs – *DDR*, which has been with us for several years, and *DDR2*. DDR2 originally offered lacklustre performance thanks to increased latency, but its rapid ramping in frequency has overcome this initial problem. Unfortunately it's still rather pricey, which is surprising considering it's meant to be cheaper to produce than DDR. We expect manufacturers will use that old chestnut about economies of scale to justify the price increase. As our benchmarks show, there still isn't a great deal of a performance difference between DDR and DDR2. In fact, our benchmarks also show that the frequency of memory doesn't make a significant difference either.

But where you'll really notice a difference when using high speed memory is when you start to overclock. If you're increasing your frontside bus speed, the memory bus is also increased. Try running a stick of DDR400 in a memory bus running at 466MHz and you'll be blessed with a machine that won't boot. Great as a doorstop, but not much good for anything else. However, if you can afford a decent stick of DDR466 it'll be quite happy to run in the overclocked memory bus.

If you're upgrading a PC with the future in mind, it makes sense to use the memory type that has the longest legs. In this case DDR2 has a clear advantage over DDR – it will be in use on a larger range of future motherboards, and will ramp up to much higher speeds. But don't be too concerned about buying the fastest DDR2 on the market, as it won't give you a significant speed increase over slower DDR2.

For this round-up, we chose a selection of common, reliable memory brands that represent the current market. These include the long-term players Corsair, OCZ, and Kingston as well the increasingly popular Geil. Chances are, these will be one of the brands you purchase.

HOW WE TESTED: Memory

The DDR sticks were tested on a 3.4GHz Prescott Pentium 4 machine using an 875P chipset stocked with a RADEON 9800XT. The DDR2 sticks were tested using the same components on a 925X-based motherboard. In order to put the memory through its paces we ran intensive tests using SuperPi and Futuremark's PCMark04.

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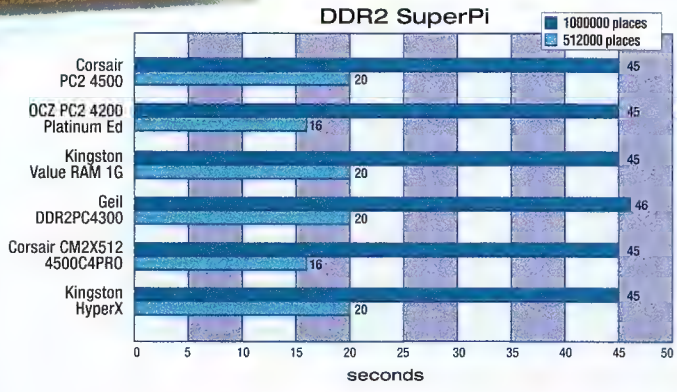
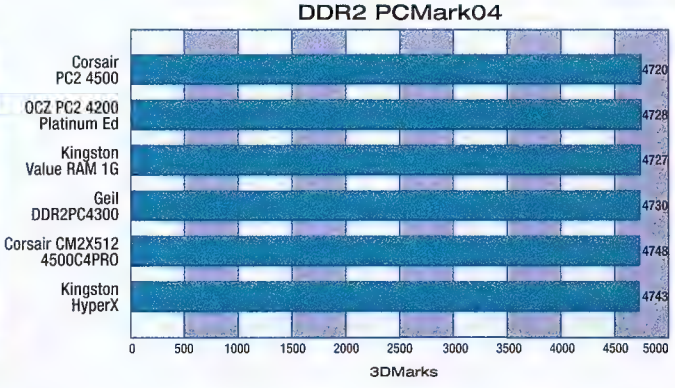
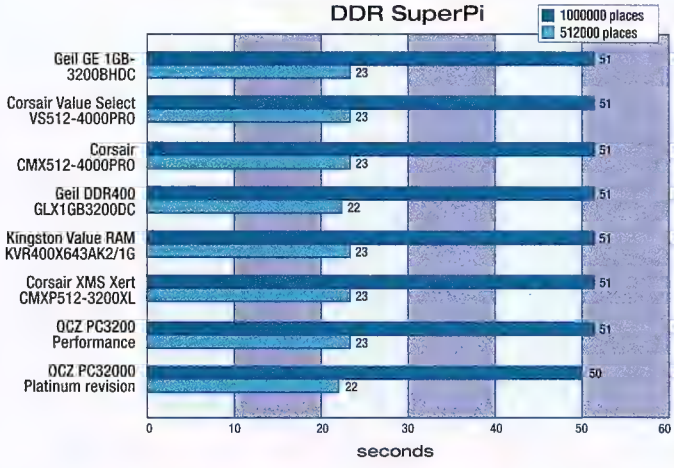
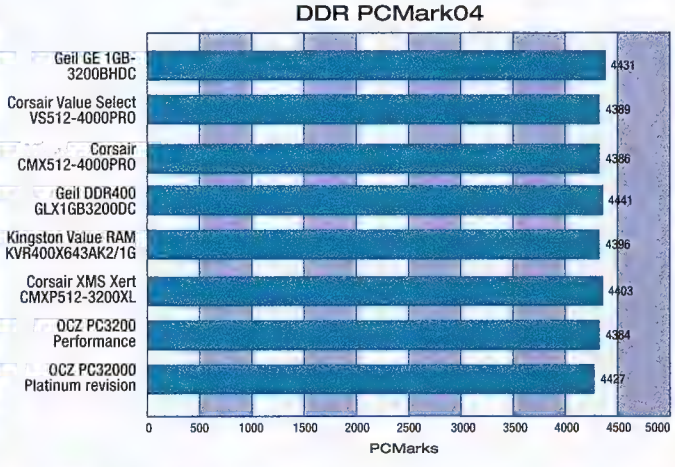
DDR or DDR2	DDR	DDR	DDR	DDR	DDR	DDR
Brand	Corsair	Corsair	Corsair	Geil	Geil	Kingston
Model	CMX512-4000PRO	Value Select VS512MB400	XPERT CMXP512-3200XL	GE1GB3200BHDC	GLX1GB3200DC	Value RAM KVR400X64C3AK2/1G
Average price (inc GST)	$515	$224	$574	$219	$379	$349
Basic specifications						
Number of sticks	2 x 512MB	2 x 512MB	2 x 512MB	2 x 512MB	2 x 512MB	2 x 512MB
Effective clock speed	500MHz	400MHz	400MHz	400MHz	400MHz	400MHz
Data bandwidth	4GB/s	3.2GB/s	3.2GB/s	3.2GB/s	3.2GB/s	3.2GB/s
Rated latency	3-4-4-8	2.5-3-3-8	2-2-2-5	2.5-6-6-3	2-5-2-2	3-3-3-3









DDR	DDR	DDR2	DDR2	DDR2	DDR2	DDR2
OCZ	OCZ	Corsair	Geil	Kingston	Kingston	OCZ
PC 3200 512MB EL Platinum Rev	PC3200 512MB Performance DC R3 CL2	CM2X512-5400C4PRO	GX21GB4300UDC	Hyper KHX5400D2K2/1G	Value RAM KVR533D2N4K2/1G	PC2 4200 512MB EB Platinum Edition
$425	$275	$520	$449	$540	$599	$435
2 x 512MB	2 x 512MB	2 x 512MB	2 x 512MB	2 x 512MB	2 x 512MB	2 x 512MB
400MHz	400MHz	667MHz	533MHz	667MHz	533MHz	533MHz
3.2GB/s	3.2GB/s	5.4GB/s	4.2GB/s	5.4GB/s	4.2GB/s	4.2GB/s
2-2-2-5	2-3-3-6	4-4-4-12	3-3-3-8	4-4-4-10	4-4-4-10	3-2-2-8

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- 12 cm silent fan, only 16dB

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(Atomic Magazine, Issue 51)

Thermaltake would like to thank all of the respondents to our Big Typhoon Competition in the last issue of Atomic. If you were not one of the lucky ones to WIN a Big Typhoon last month, Thermaltake have another offer for you.

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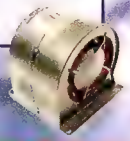

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graphics wonderland

Video fever

The one area of the PC that is experiencing the most rapid rate of change has to be video cards. Not only do they seem to double in performance every 12 to 18 months, but the variety of features they support keeps growing at an astonishing pace. However, the most pertinent question regarding buying a new video card has to be: to PCI Express or not to PCI Express?

Thankfully we're now at a stage where the PCI Express interface has finally begun to mature to the point where components using it are affordable. The price difference between a PCI Express card and its AGP variant is almost negligible, and the initial performance decrease that PCI Express cards seemed to suffer appears to have been resolved. Basically you can expect both the AGP and PCI Express cards based around the same chipset to perform identically (unless you're that single guy in Tasmania who does HD video editing on his PC). Obviously the move to a PCI Express platform will help to futureproof your upgraded system as well.

In terms of features, the major difference between ATI and NVIDIA cards is support for Shader Model 3.0. While NVIDIA likes to tout this as a major feature on its high end cards, the truth of the matter is that it really doesn't make any difference whether or not your card supports this feature. This is because the number of games with support is small. By the time more of these games do exist, ATI's next generation of cards will be here, which will support Shader Model 3.0.

Even though the graphics market is well and truly dominated by ATI and NVIDIA, the vast range of chipsets from each makes choosing a single chipset a daunting task. The fact that new products arrive every six months doesn't help the matter. To make matters worse is the fact that we're right on the cusp of another generation of products. These new chipsets promise to double the performance at the high end, making anything you purchase right now doomed to obsolescence in the very near future.

However, if you're an impatient geek who simply can't wait a few months for the next gen, there are a wide range of video cards currently available to accommodate every budget. If you're prepared to pay big bucks, ATI's X850XT is unbeatable, although NVIDIA's 6800 Ultra comes fairly close. If you're prepared to pay the mega bucks, a couple of 6800 Ultras in SLI mode is the ultimate in pants-dropping performance, but you'll need a huge monitor to make the most of the silly resolutions that are possible. Not to mention a wealthy sugar daddy to pay for it.

The best bang for buck lies in the mid-range video cards, which sell for around $500-$600. These cards offer excellent performance in all of today's games, and include chipsets such as the 6800GT and X800XL. If you buy in this range and upwards, the ability to enable decent levels of antialiasing and anisotropic filtering is possible, even at respectable resolutions such as 1280 x 1024. Once you've seen these two effects in operation, it's very difficult to go back to visuals without them.

Chipset	GPU	Pipelines	GPU freq	Memory freq	Memory bus	Avg. price
X850XT	R480	16	540	1180	256-bit	$890
6800 Ultra	NV45	16	400	1100	256-bit	$900
6600GT	NV43	8	500	1000	128-bit	$750
X700XT	RV410	8	475	1050	128-bit	$380
6200	NV43	4	300	550	128-bit	$160
X300	RV370	4	325	400	128-bit	$140

HOW WE TESTED: Video cards

In order to level the playing field, testing focussed on the raw performance produced by each of the chipset cores we looked at. For this we used original production samples from ATI and NVIDIA. Manufacturer cards with BIOS tweaks and faster RAM will see increased performance above these baseline values. All cards were tested in a nForce 4 SLI motherboard with an FX-53 CPU. 1GB of DDR400 memory was used, running in dual-channel mode, as well as a Seagate SATA 120GB hard drive with a fresh install of Windows XP. As with previous tests, the focus was on games to test video performance. However, we were limited to testing at 1024 x 768, as the cheaper cards couldn't handle antialiasing and anisotropic filtering at higher resolutions.

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PERFORMANCE ANALYSIS VIDEO CARDS

ATI RADEON X850XT Platinum Edition

Even though this is the fastest on the market, it can still be had for around $750. Considering high end cards once cost $1000 or more, this is exceptional. You might have problems tracking one down though, as supply issues have made these rarer than hen's teeth in a poultry dental surgery. Based on the R480 GPU clocked at a whopping 540MHz, the X850XT's 16 pipelines chew through anything you can throw at it. 256MB of memory is clocked at 1180MHz, and it all runs over a 256-bit memory bus. No wonder then that it took out the number one spot in nearly every single benchmark, edging out the 6800 Ultra by at least 10 percent.

NVIDIA GeForce 6800 Ultra

In terms of specs, the 6800 Ultra is very close to the X850XT. The NV45 GPU uses 16 pipelines, and churns over at 400MHz. Its 256MB of memory is clocked at 1100MHz, and also runs over a 256-bit memory bus. The major feature difference is the inclusion of Shader Model 3.0 support, but as mentioned earlier this feature is really only good for advertising hype. While the X850XT is the faster chipset, the 6800 Ultra isn't far behind. As expected, it kicks ATI butt in Doom 3, but this engine isn't in use by any other games. Surprisingly it manages to keep up with the ATI card in Half-Life 2, a game which supposedly favours ATI hardware.

NVIDIA GeForce 6600GT

Once again we're blown away by the performance offered by such a relatively cheap component. At only $275, cards based on this chipset are quite happy to run most of today's games, albeit at lower resolutions than the high end. Based around the NV43 GPU, which has 8 pipelines and runs at 500MHz. It has half the memory of the bigger cards, at 128MB running at 550MHz over a 128-bit memory bus. Yet these specifications don't seem to hurt the card too badly. As our benchmarks attest, it can chew through some of today's most demanding games when the resolution is limited to 1024 x 768 and anti-aliasing and anisotropic filtering are disabled.

ATI RADEON X700XT

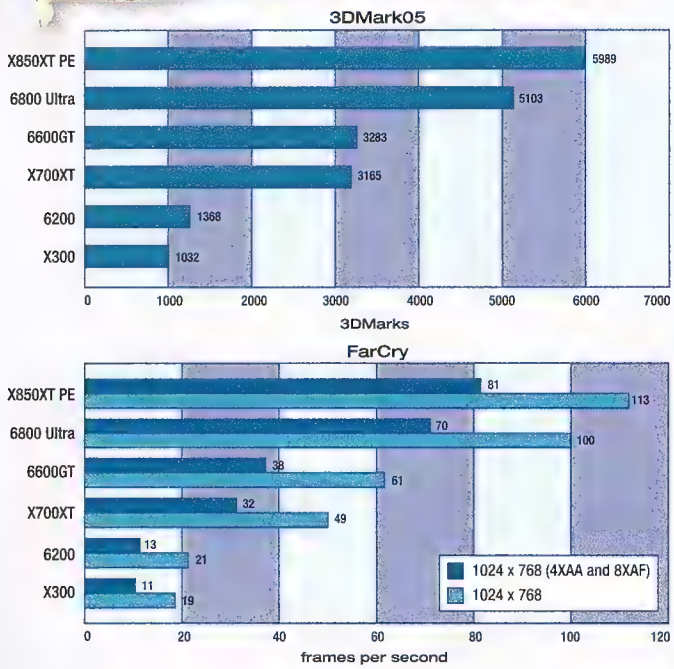
Retailing for around $300 for the 128MB version and $400 for the 256MB version, we expected the X700XT to have one up over the GeForce 6600GT. Unfortunately for ATI this doesn't appear to be the case, as the 6600GT managed to beat it in every benchmark. The X700XT uses the RV410 GPU, which is clocked at 475MHz and has 8 pipelines. The memory runs at 1050MHz over a 128-bit memory bus. It performs close to the 6600GT in 3DMark05 and Half-Life 2, but loses quite badly in both Doom 3 and FarCry. As a result we can't recommend cards based on this chipset for those with $300 to spare – go for the 6600GT instead.

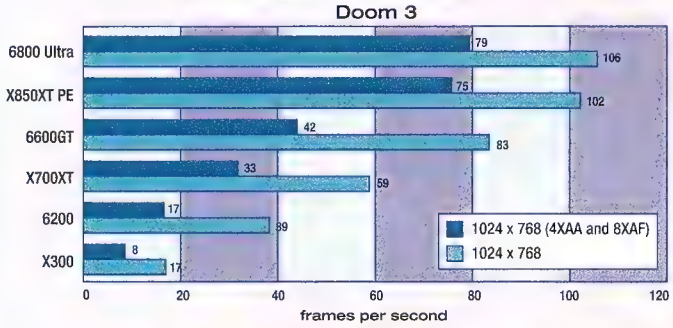
NVIDIA GeForce 6200

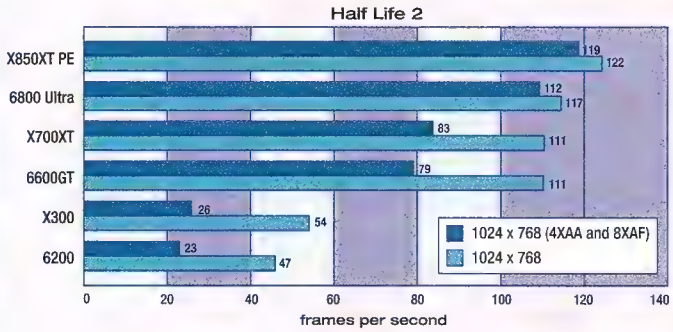
There must be some rather poor gamers in this world for cards like this to exist. While most Atomicans would rather eat their own toenail clippings than play on a card this slow, it's a fact of life that not everybody can afford to play games with all the bells and whistles. Or any bells and whistles enabled at all if the performance results of this card are anything to go by. Like the 6600GT, the 6200 has a NV43 core, but only 4 pipelines to work with. It's clocked at 300MHz, while the 128MB of memory is clocked at 550MHz. It's the meagre amount of pipelines that accounts for the poor performance – sure, it can play games at 640 x 480 OK, but so does an Xbox.

ATI RADEON X300

Unlike the 6200, the X300 actually offers blistering performance for a card that retails under the $100 mark. To our amazement, it actually kept up with the 6800 Ultra in most benchmarks, even when running at 1600 x 1200, with 4XAA and 8XAF. We watched in awe as it made the X850XT weep in the Half-Life 2 benchmark. How could this be possible in such a cheap card? Well, it wasn't, we fibbed! This card is even slower than the slovenly 6200. What do you expect for the price?







The power of choice

Wether money is no obstacle or you're looking for the best price/performance ratio, the upgrading game is about building the fastest box your money can buy. Sometimes, a gradual upgrade is a great way to extend the life of a system without breaking the bank. But if a new system is on the cards, start with the CPU and build out from there. Remember, buying at the pinnacle of the curve isn't cost efficient, but one step down usually is – getting a GeForce 6600GT over a 6800 Ultra, for example, and spending the money saved on other parts of your system can provide a greater overall performance increase. If you're Bill Gates however, there is nothing more spankworthy at the moment than a P4 3.73GHz system sporting two 6800 Ultras in SLI. Dang, there go my pants again.

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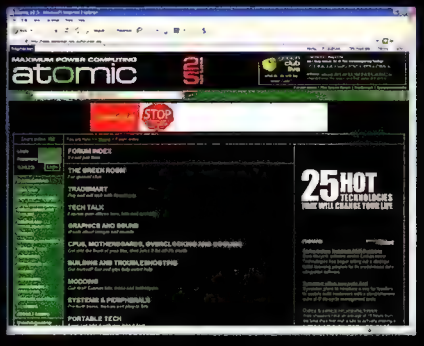

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There be booty!

So you're bored of that same old Windows XP boot screen. Well, make your own! Download and install *Bootskin*, made by the lovely Stardock from **www.stardock.com/products/bootskin** and you're away. Note that you're limited to 640 x 480 @ 16 colours, and will have to save as a BMP. Check out **www.netbadger.com/bootskin_tutorial** and **www.joeuser.com/articles.asp?aid=1886** for tutorials.

But what if you want the boot screen completely gone? Easy enough. Right click on My Computer -> Properties -> Advanced and click the Settings button under Startup and Recovery. Click the Edit button and at the end of the operating systems line (**multi(0)disk(0)rdisk(0)partition(1)** or similar), add **/SOS**. Reboot, and wallah!

Burning desires

CD burning under Linux is pretty easy these days using GNOME's built-in support, or apps like K3b, but if your system is in strife you might need to burn a rescue CD quickly, and you may not be able to log in to X and use your favourite tools. Burning from the command-line once took some fiddling, but with a recent 'cdrtools' package and kernel, burning an ISO image is super simple:

```
sudo cdrecord -v -eject dev=/dev/cdrom cd.iso
```

To burn some random files on to a CD, put them in a directory and make an ISO image to burn first:

```
mkisofs -J -R files >files.iso
```

Or, skip the middle-man and burn straight to disc like so:

```
mkisofs -J -R files | cdrecord -v -eject dev=/dev/cdrom -
```

Score one more for the powerful CLI!

Full LED lovin'

LEDs are a fantastic addition to any case-mod, but many have a major drawback – a limited angle of spread. If you are not within the 30 or so degrees-from-centre of the 'firing range' you miss the whole effect, especially with water clear lens where the light passes straight through the acrylic. This can be fixed as follows:

- A short length of clear 5mm diameter heat shrink, slid over the LED like a condom and shrunk down with a hairdryer, making sure that it covers the end of the lens, or
- Use 1200 grit Wet'n'Dry sandpaper to scuff-up the LED lens, making sure that the end receives plenty of attention.

Either of these methods will make the lens more opaque, and aid in diffusing the emitted light over a more even area around the lens.

Portal of opportunity

Craig Simms will have a small Sprite, thanks.

Way back in 2003, Xbox Media Centre (XBMC) was unleashed on the world, the Xbox's true potential was discovered, and people around the world saw the light. A year later, the PC alternative, MyHTPC, became the commercial entity Meedio, halting all development on their freeware product. A vacuum was created, someone smelt opportunity and XBMC was finally ported to the PC under the name Media Portal. Not content at just that, it was extended to include TV channels, recording functions, a plugin infrastructure, and is becoming one of the fastest developed open source projects on the web today. In 2005, it ends up in an *Atomic* tutorial to help you make the most of the convergence revolution.

Initial setup

Version check! Make sure you're running Windows XP SP2, and have the latest Windows Media Player and .NET Framework installed. Download Media Portal from **mediaportal.sourceforge.net** and install it. You'll also want to grab Daemon Tools from **www.daemon-tools.cc** and install it too, so Media Portal can auto-mount and playback CD and DVD images in the virtual drive it creates.

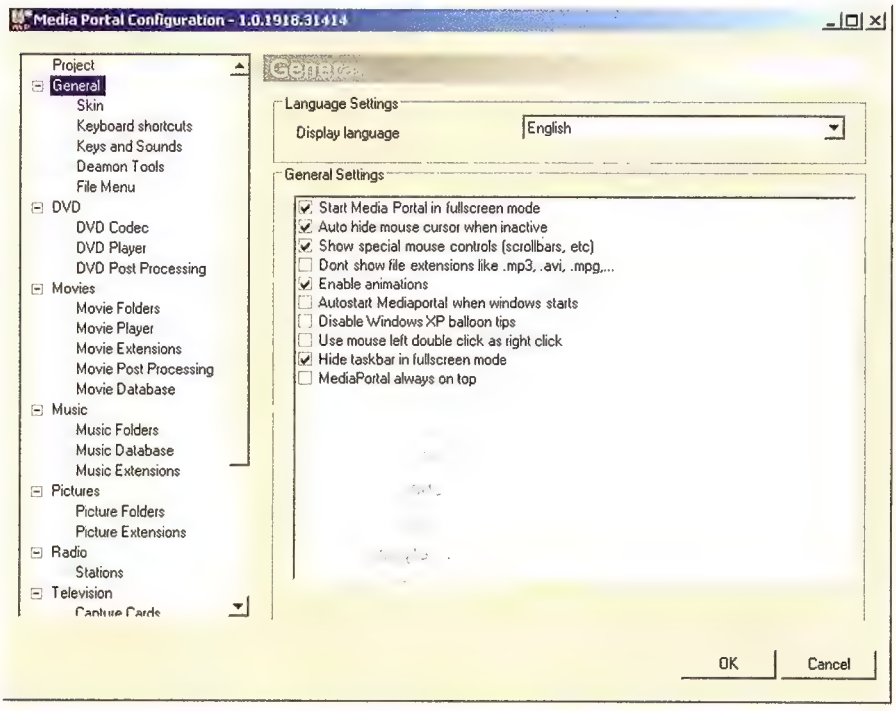
Choose Configure from the Start menu, and select General. Check 'Start Media Portal in full screen mode', 'Auto hide the mouse cursor when inactive' (so it disappears after a given time when playing a movie), 'Show special mouse controls', 'Enable animations' and 'Hide taskbar in fullscreen mode'. If you're setting up an HTPC machine, you'll also want to check 'Autostart Media Portal when Windows starts'. You'll want to deselect 'Don't show file extensions', as they will be useful to trouble shoot later if necessary. Deselecting 'Media Portal always on top' is also a wise choice, as it will allow you to properly Alt-Tab to different programs should you need to change something in the background. Finally, the right mouse button is used as a 'back' button, so if you use a mouse or remote that emulates one and would prefer to double click instead, select 'Use mouse left double click as right click'.

Expand the General tree and select 'Deamon Tools' (sic). Enter its installed location in the first field, and set the virtual drive letter that has been assigned to the program.

Flick down to DVD, where most likely you'll want to turn off the subtitles, and set your preferred aspect ratio – for the average viewer, stretch and default display mode will do just fine. If you want to stop flicker in the right click OSD during playback, you'll also want to set the video renderer to Video Rendering Mixer 9 – Renderless from the DVD Player submenu.

On to the Movies section – here we want to set a playlist directory – you'll need to do this in the Music section too, or else the configuration utility will complain when you try to close it. Expand the tree and select Movie Folders. Here you can add all the directories and/or drives you want Media Portal to have access to and their aliases. You can also lock out sensitive folders by setting a pincode that needs to be entered before Media Portal will open it. Once again, all of this is mirrored in the Music section, and additionally in the Pictures section, so set up to your liking.

On to the Radio section. Here you can set a folder for where your downloaded stream files



▲ **More options than a gopher looking for a new home in a nudist camp.**

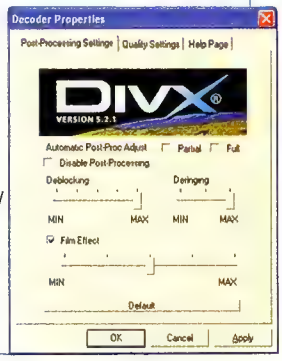
Codec moments

So your media centre is set up, Media Portal is running well, but it simply refuses to play some files. This is most likely because you don't have the correct codec installed for the job.

Codecs are a sticky subject – like the old days of DLL hell that plagued Win95 and before, they are all too ready to conflict with one another, a perfect argument to stay away from the mega bundled codec packs. Add in the legal minefield of licensing and the dubious status of codec rip packs such as Quicktime Alternative and Real Alternative, and it becomes messy all too quickly.

To end the pain, we've listed the most commonly used codecs, filters and formats below for your benefit – as well as some very useful tools.

AC3Filter **ac3filter.sourceforge.net**
AviCodec **avicodec.duby.info**
CoreAAC **coreaac.corecodec.org**
DirectVobSub **www.afterdawn.com/software/video_software/subtitle_tools/vobsub.cfm**
FLAC **flac.sourceforge.net**
Gspot **www.headbands.com/gspot**
Koepi's XVID **www.koepi.org**
Matroska **www.matroska.org**
OGG **tobias.everwicked.com/oggds.htm**
Windows Media **www.microsoft.com/windows/windowsmedia/format/codecdownload.aspx**
DivX **www.divx.com**



are stored – anything saved in this folder will automatically turn up in Media Portal's 'My Radio' section. Note that Media Portal uses Media Player for streaming, so your radio station of choice will need to support the ASX format (all your streaming options should also be set first through Media Player, as opposed to Media Portal). Alternatively, for greater control over things like station names or genres, expand the tree, select Stations, click Add, change the type to 'Stream' and enter the appropriate details. For example, to add the ubiquitous JJJ, we'd enter **JJJ** for the name, **Alternative** for the genre, and set the URL to **www.abc.net.au/streaming/triplej.asx**.

Since JJJ only offers one bitrate, we can leave that section alone – however for other stations note that the value you enter is regarded as Kb/s. Also note that audio streams need to buffer before playing, and Media Portal displays nothing on screen to represent this – so if it appears to do nothing at first, just wait! The music will come. In this section you can also search for shoutcast streams, or add analog stations if you have an FM receiver card.

Mosey to the Weather section, and click the Add button to search for the city of your choice (note that you'll need an internet connection for this). You can add as many as you like.

Finally, select the Plugins section. Here you can enable or disable anything that appears on the startup 'home' page of Media Portal, as well as add extra things like an email checker, RSS news feeds, your online MSN contacts or change the default player for given filetypes to WinAmp or Foobar.

To change the settings for each plugin, you'll need to click on the grey cell for the respective plugin on the left and hit the Setup button – clicking anywhere else will result in the program telling you that no plugin is selected.

But what about Television and Remote? Unfortunately these sections are highly dependent on your hardware or where you live – so your best bet is to hit the Media Portal forums, and do a search for Australian TV.

The sounds of silence

A silent interface is a good interface, so let's remove the annoying sounds that are played everytime you perform an action in Media Portal. While we can do this through the General\Keys and Sounds menu in the config tool, it's much easier to simply open up 'Keymap.xml' from your install directory in a text editor, and globally replace 'click.wav', 'cursor.wav' and 'back.wav' with nothing. Pretty much all config files are similarly stored in XML files, so if you prefer code to GUI, take a wander through your installed directory.

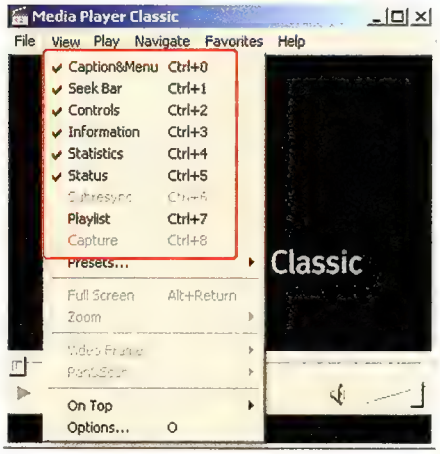
Finally, there seems to be no way to kill the default clicking noise when the mouse buttons are used, so if you want complete

silence, you'll need to replace the 'click.wav' file found inside the **skin\[name of skin you're using]\sounds** folder with a silent wav file – just deleting it will cause Media Portal to try and install itself again to recover the missing file.

Lock'n'load

On the final leg! Load Media Portal. Most likely it will harass you about not having FFDShow installed – tell it to not show the message again and click OK.

Monitor users can skip this part and bask in the glory of their newly setup system – however if you're running Media Portal through a TV, you'll need to head to Settings, Screen Calib, then Screen Calib again. A standard TV typically overscans – that is, makes the picture slightly larger than the borders – so the image appears to fill the whole screen. Since the



▲ **No, Artoo, turn them all off!**

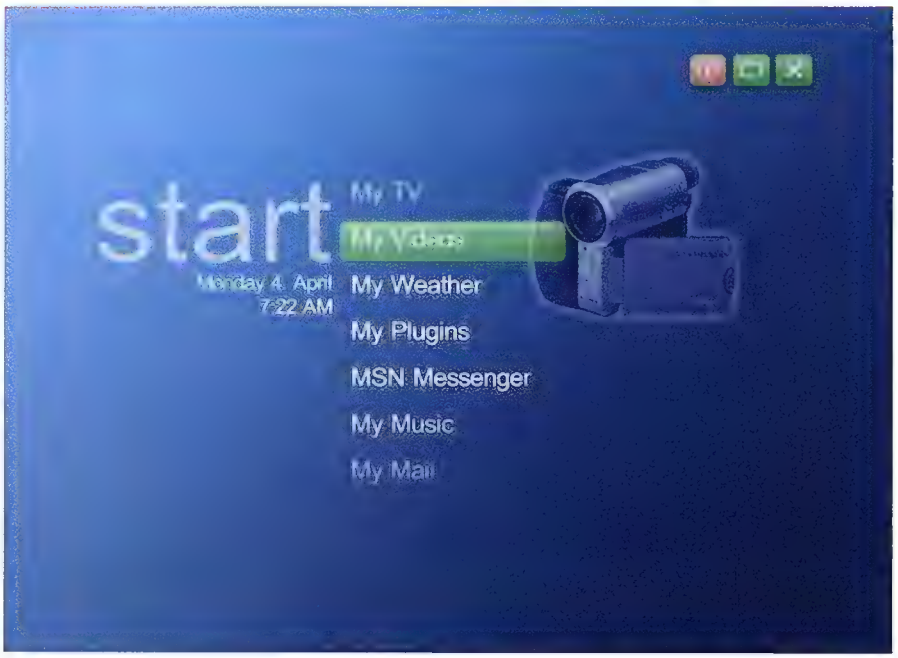
amount of overscan varies from TV to TV, here we are setting where the top left and bottom right edges of the video will be displayed. Simply use the arrow keys to move, and enter to cycle to the next option. When you're done, hit Esc to return to the previous menu. Enter UI Calibration and centre the screen, then go back to the main menu. From this point on most settings are personalisations, so spend some time customising the config utililties and settings menu, and enjoy the fruits of convergent multimedia technology to its full potential!

Play it again, classically?

So the port of Mplayer that's embedded in Media Portal isn't playing all the formats you want, or isn't offering the flexibility you need – why don't we hook up an external player?

In this case we're going to use the excellent Media Player Classic (MPC) – but there's a few tweaks that we will need to perform first to make the change seamless. First, grab MPC from **www.sourceforge.net/projects/guliverkli**, and extract to a directory of your choice. Open up the Media Portal config tool, browse to Movies\Movie Player, click the Browse button and point it towards where you extracted **mplayerc.exe**.

In the parameters field, enter **/play /close /fullscreen %filename%**. This will autoplay, autoclose when finished, and launch the select movie in fullscreen.



▲ **Just like your cat, it's skinnable.**

We want MPC to open as seamlessly as possible, so this means turning off a lot of the UI. Open MPC, go to View and turn off everything.

Create a new TXT file, and call it MPC.REG. Copy the following into the file, or if you're confident enough, just edit the registry directly:

```
Windows Registry Editor Version 5.00
[HKEY_CURRENT_USER\Software\
Gabest\Media Player Classic\Settings]
"AutoZoom"=dword:00000000
```

▲ **Preview mode allows the movie or music to continue playing.**

0x000 0800 ▶ 00 00 08 00 ▶ 00 08 00 00

▲ **Reversed hex couplets. Sexier than the Dahm triplets.**

"RememberWindowPos"=dword: 00000001
"RememberWindowSize"=dword: 00000001

This effectively tells MPC to remember its position and size and switches off the autozoom function so the window doesn't resize/rescale to fit the media.

As it stands if we save the REG file now and import it into the registry by double clicking on it, Media Portal will play movie files just fine. Unfortunately it's very obvious that an external application is being called as MPC appears first, warts and all, then goes fullscreen. Let's make the process even more transparent, shall we?

Firstly, we don't want the borders of the MPC window to show at all (even though it eventually goes fullscreen), so we want to reposition the window slightly offscreen, then resize the borders so they exceed the resolution of the screen.

If you don't care for coordinate theory and just want to get things started, check out the Resolution Quick Reference box below where we've provided the details for a number of resolutions. If your resolution isn't in the list, or you're just interested, read on.

▲ **Red disco ball of fury! Media Portal uses Media Player's visualisations.**

Window coordinates for MPC in the Windows registry are stored as sixteen sets of reversed hex couplets. Who in the what now? OK, let's look at the hex part first. Hex is similar to the decimal number system you know and love, but adds the letters A through to F after 9. Now, let's say you have the number 2048. In eight digit hex this is represented as 0x0000 0800 (the 0x at the front signifying it is a hex number), which in turn is represented in the Windows registry as 00 08 00 00. They've simply split the first number into two digit sections, then reversed the order.

The first eight couplets we need are for the window positioning. In terms of pixels, the top left of the screen (origin) is 0 pixels across, and 0 pixels down. This is represented in the Windows registry as 00 00 00 00 00 00. The first eight digits represent the x axis, the second eight represent the y. If we wanted the window to be 9 pixels down and 5 pixels right from the origin, the value required would be 05 00 00 00 09 00 00 00. We want the window to start 3 pixels up and to the left of origin, so the value we want for each coordinate is 3 less than 00 00 00 00 in hex terms. As this is already the lowest possible value, this means we have to 'clock' it and enter the maximum value (FF FF FF FF) minus three. Therefore the value we want to position the window 3 pixels offscreen in either direction is FD FF FF FF FD FF FF FF. So add another line at the end of your .reg file so it reads **"LastWindowRect"=hex: FD,FF,FF,FF,FD,FF,FF,FF.**

The second set of couplets represent how large the MPC window is. As we just moved the window 3 pixels up and to the left, it makes sense that we'd want to make the window 3 pixels larger than your resolution to compensate for the gap that would otherwise appear at the bottom right of your screen. So, open everyone's best friend, Calculator, and go to the View menu and switch it to Scientific.

Let's say your resolution is standard PAL, that is, 720 x 576. So we want our window size to be 723 x 579. Punch 723 into the calculator, and change the radio buttons up the top from Dec to Hex. You should get the value 2D3. Do the same for 579 (243). So your remaining sixteen values are D3 02 00 00 43 02 00 00. So the full line to add to your .reg file would be **"LastWindowRect"=hex:FD,FF,FF,FF,FD,FF,FF,FF,D3,02,00,00,43,02,00,00**.

If you have a different resolution, do the appropriate calulations, then save the file, double click on it to import it into the registry and you're away!

If you want to take it that one step further, make a loading screen for MPC to replace the standard logo.

Resolution Quick Reference

Simply find the resolution of your screen/video output, then add the appropriate line to the end of your REG file and import it into the registry.

Resolution	Registry Line
640 x 480	**"LastWindowRect"=hex:FD,FF,FF,FF,FD,FF,FF,FF,83,02,00,00,E3,01,00,00**
720 x 576	**"LastWindowRect"=hex:FD,FF,FF,FF,FD,FF,FF,FF,D3,02,00,00,43,02,00,00**
800 x 600	**"LastWindowRect"=hex:FD,FF,FF,FF,FD,FF,FF,FF,23,03,00,00,5B,02,00,00**
852 x 480	**"LastWindowRect"=hex:FD,FF,FF,FF,FD,FF,FF,FF,57,03,00,00,E3,01,00,00**
1024 x 768	**"LastWindowRect"=hex:FD,FF,FF,FF,FD,FF,FF,FF,03,04,00,00,03,03,00,00**
1280 x 720	**"LastWindowRect"=hex:FD,FF,FF,FF,FD,FF,FF,FF,03,05,00,00,D3,02,00,00**
1280 x 1024	**"LastWindowRect"=hex:FD,FF,FF,FF,FD,FF,FF,FF,03,05,00,00,03,04,00,00**
1600 x 1200	**"LastWindowRect"=hex:FD,FF,FF,FF,FD,FF,FF,FF,43,06,00,00,B3,04,00,00**
1920 x 1080	**"LastWindowRect"=hex:FD,FF,FF,FF,FD,FF,FF,FF,83,07,00,00,3B,04,00,00**

PVR power

Missed that latest episode of *Alias*? No more! Leigh Dyer shows you how to master MythTV heaven.

If you're still watching TV the old-fashioned way, firing up the VCR to tape your favourite shows when you leave the house, it's time to build a PVR. You'll never have to touch another tape, and you'll never miss your favourite shows again. You can even rewind live TV – perfect for when you could swear you saw an exposed nipple in the last ad break.

The US has had PVR services from companies like TiVo and ReplayTV for years, but in the land of Oz we've had to go the DIY route. Windows Media Center Edition promises to improve the situation, but without a live TV guide, we'll avoid it for the moment. The best option today is MythTV, a fully functional PVR program for Linux systems.

Using a PC as your media hub has advantages over a dedicated device as well, as you can use it for much more than just watching TV. With some MythTV add-ons, you can bring TV, CDs, MP3s, DVDs and downloaded videos together into a glorious orgy of audiovisual entertainment.

Hardware shenanigans

To build a PVR box, you need some hardware. What you'll need depends on exactly what you're after, but the idea here is to build a machine that can sit in the lounge room and function as an integral part of your home theatre set-up. For a good minimal setup, you'll need:

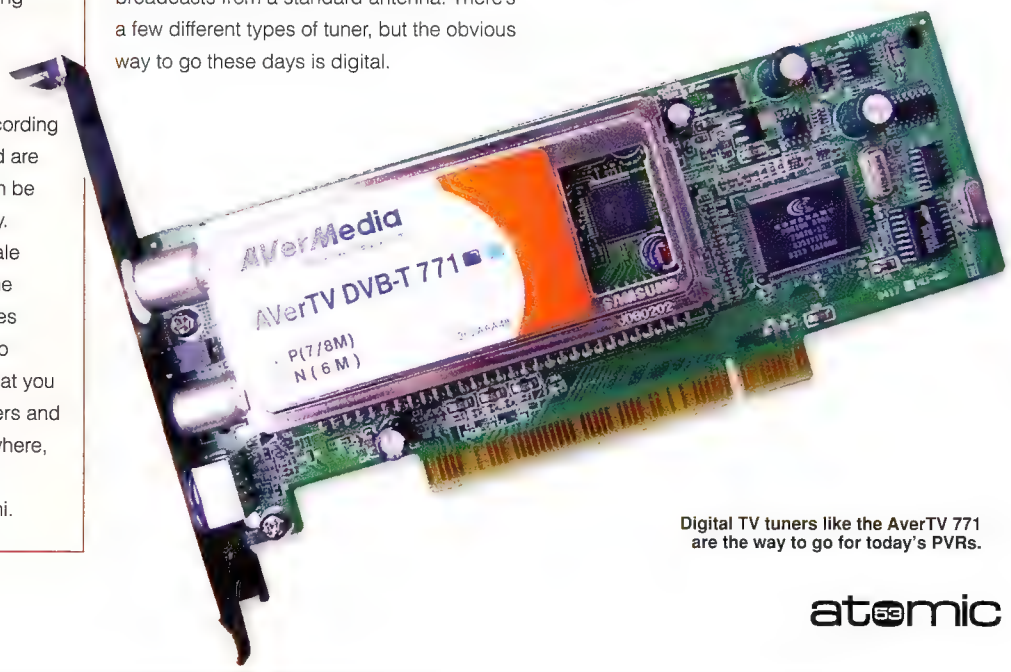
- **A decent PC**
- **Video card with TV-out**
- **TV tuner card**
- **IR remote control**
- **DVD-ROM drive**
- **A nice big hard drive**

The TV tuner is the key component here, giving your PC the ability to decode TV broadcasts from a standard antenna. There's a few different types of tuner, but the obvious way to go these days is digital.

The major networks have all been transmitting digital TV signals for a while now, and with the improved video and sound quality that digital provides, the decision to go digital is a no-brainer.

Another benefit to going digital is that it reduces your PVR's CPU demands. PVRs need to both encode and decode video, and when watching live TV with timeshifting, or watching a program while it's being recorded, it needs to manage both at once. Simple analog tuners output raw data, which MythTV has to encode to MPEG-4 in software, but digital TV is already transmitted in MPEG-2 format. With the encoding out of the way, an old P3 or Athlon CPU should be all your PVR needs.

All of the other hardware is self-explanatory, except perhaps for the video card. TV-out was once quite an achievement under Linux, but these days you'll find that most cards should work fine. The NVIDIA binary drivers in particular have quite solid TV-out support, so any recent NVIDIA card should work fine.



Digital TV tuners like the AverTV 771 are the way to go for today's PVRs.

Clients and servers

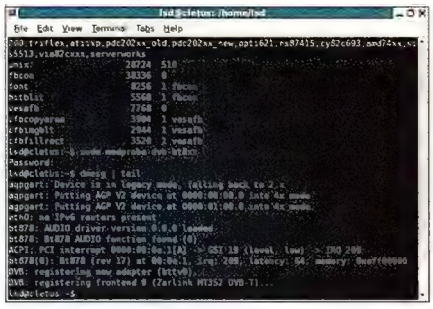
MythTV has a flexible client/server design. The GUI-less backend server controls the TV tuner and handles the recording tasks, while the frontend acts as the user interface, letting the user play recorded files or live TV from the backend, and edit the backend's recording schedule. The frontend and backend are usually on the same PC, but they can be seperated by a network just as easily.

MythTV's design also lets you scale up to multiple capture cards, with the backend automatically farming duties out to each card when recording two programs at once. This all means that you can hide a big PC stacked with tuners and 400GB drives in a cupboard somewhere, and have a tiny PC in the lounge – perhaps even an Xbox or Mac mini.

Configuring the digital TV tuner

Before you can think of installing MythTV, you need to make sure your TV tuner is working as it should be. We used an AverMedia AverTV 771 DVB-T card, based on a BT878 chipset – cards using other chipsets will use different drivers, but the remaining steps will be the same..

1 Install the kernel drivers. For the Avermedia card, all of the needed drivers are in the 2.6 kernel tree, so as long as you're running a recent kernel you should be ready to go. Load the modules with the following commands:



▲ **Loading the DVB drivers in to the kernel.**

```
sudo modprobe bttv
sudo modprobe dvb-bt8xx
```

If all goes well, the output from the 'dmesg' command should tell you that a new DVB device has been configured.

```
DVB: registering new adapter (bttv0).
DVB: registering frontend 0 (Zarlink
MT352 DVB-T)...
```

2 Install the DVB userspace apps. In Debian, you will find these inside a package called 'dvb-utils'

3 Scan the airwaves for channels. The dvb-utils package includes a program called 'scan' that does just this. Run 'scan', supplying it with the frequency table for your region:

```
scan /usr/share/doc/dvb-utils/
examples/scan/dvb-t/au-Melbourne
>channels.conf
```

The scan will take a few minutes, and should report on the channels that it has found.

4 Test your signal strength by tuning in to a channel. Use the 'tzap' command:

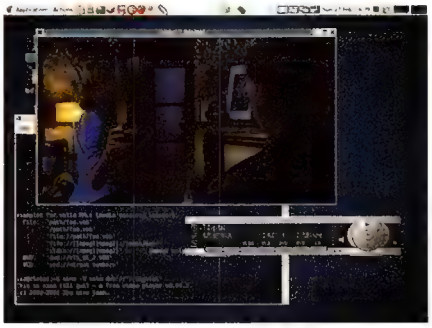
```
tzap -c channels.conf "7 Digital"
```

The output from tzap reports the signal strength, the signal-to-noise ratio (SNR), the bit-error rate (BER) and the number of uncorreceted errors (UNC). If you're getting a good signal, both the BER and UNC should be zero.

5 Using Xine, try tuning in to a broadcast. Copy your channels.conf file in to the ~/.xine/ directory, and run:

```
xine dvb://"7 Digital"
```

If everything works according to plan, you're ready to start installing MythTV.



▲ **Xine is a great test app for your digital tuner setup.**

Dialling up the beast

MythTV has earned itself a bit of a reputation for being tricky to set up, and to be honest, it's entirely justified. The developers are taking steps to improve the process, but for the moment you're stuck with quite a bit of fiddling to do. It's worth it in the end though.

1 Install the MythTV packages for your distribution. On Debian, there's an unofficial repository containing packages for the latest MythTV and its various add-ons. Add the following lines to your '/etc/apt/sources.list':

```
deb ftp://ftp.nerim.net/debian-marillat/
unstable main
deb http://dijkstra.csh.rit.edu/~mdz/
debian unstable mythtv
```

Now, do an 'apt-get update', followed by an 'apt-get install mythtv'. MythTV has quite a lot of dependencies, including the MySQL database server, so installing everything might take a little while. These unofficial packages are quite nicely put together though – if you haven't installed MySQL before now and fiddled with its configuration, MythTV will automatically set up its own database and configure access to it.

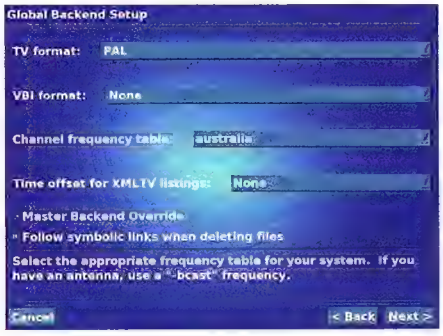
2 Run the MythTV setup program, which handles most of MythTV's configuration. It needs to be run as the 'mythtv' user, which is also conveniently created for you by the Debian packages. Set a password for the mythtv user, and then login to X under this account:

```
sudo passwd mythtv
```

▲ **MythTV's GUI-based setup app, with easy keyboard navigation.**

Once X is running, open a terminal and run 'mythtv-setup'. Select your language, and then anwser 'Yes' to the two questions asking whether or not to reset your capture card and channel configuration. The MythTV setup menu should now appear with five main sections, which you'll need to enter in turn. MythTV doesn't use the mouse at all, so to navigate around, use the cursor keys to move between options, and Enter or Space to select options. Esc moves you back up one level in the menus.

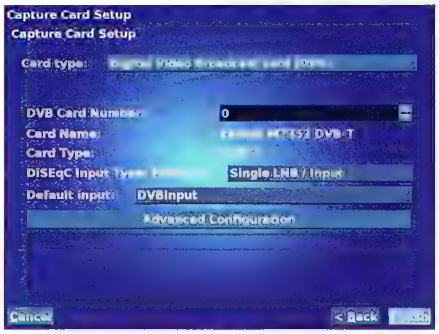
General



These are MythTV's most fundamental settings. For Australia, you'll have to set the TV standard to 'PAL' and the frequency table to 'Australia'.

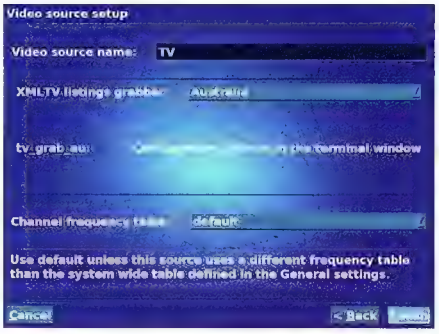
You can also configure the directory used to store recorded programs, and the location and size of the live TV buffer – this controls how far back you can rewind live TV.

Capture cards



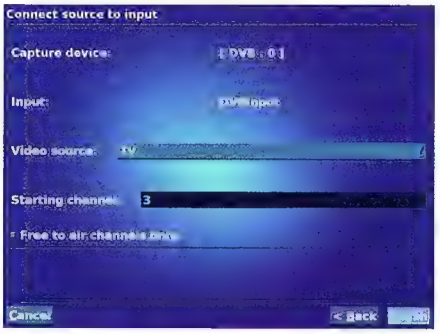
Configure your capture card here by selecting 'New capture card'. Change the card type to 'Digital Video Broadcast card (DVB)', and select Finish.

Video sources



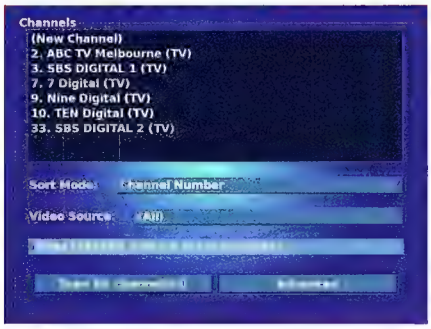
Create a new video source, and enter a name for it (such as 'TV'). Set the XMLTV grabber to 'Australia' and select Finish. A dialog will appear warning you that there was a problem running the XMLTV grabber – ignore this for the moment.

Input connections



Here, you bind your capture card to the video source you've created. Select your capture card from the list, then select your video source.

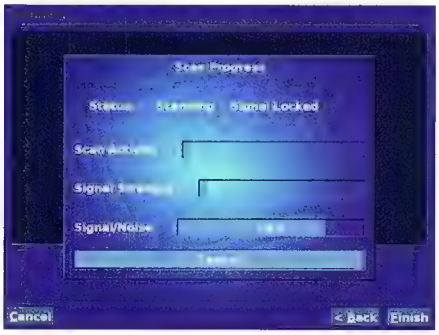
Channel Editor



Configuring your TV channels is probably the most fiddly and error-prone part of the MythTV setup process. The latest version (0.17) adds an automatic channel scanner for digital tuners, but it doesn't seem to work as advertised in Australia yet. The best way to create your channels is to follow these steps for each TV network:

1. Load up the channels.conf file created by the 'scan' program earlier. This file contains one line for each TV channel broken into fields, with the name at the start. The second field is the base frequency for that network's broadcasts – it should be the same across each channel for a given network. Note down the frequency for the network you'd like to tune in.

2. Return to the Channel Editor screen, hit Advanced, and then select New Transport in the transports list. In the transport settings screen, enter the frequency from step 1, set the bandwidth to 7MHz, and hit Finish. Hit the Esc key to get back to the main Channel Editor screen.



3. Hit the 'Scan for channel(s)' button. Select Existing Transport Scan as the Scan Type, and then select the transport you created in step 2. Hit Next twice and the scan will begin. After a few seconds, you should see a list of the channels found, which will be added to the channel list.

   Repeat this process for each TV network until all of the available channels have been scanned in. Once that's done, choose a channel, note down its number (in brackets next to the name), and enter that channel number in as the starting channel on the Input connections screen. This is the channel that live TV watching will begin from. Setting this is critical – without it, everything will go pear-shaped when you try to watch TV later.

   With the setup complete, hit Esc from the main menu to exit the setup program.

4. Start the MythTV backend server:

   sudo /etc/init.d/mythtv-backend start

5. Start the MythTV frontend which, like mythtv-setup, has to be run as the mythtv user:

   mythfrontend

The MythTV frontend is the interface that controls everything in MythTV, including watching live TV and recorded programs, browsing the TV guide, and configuring programs to be recorded. Hit the 'Watch TV' button, and if everything has gone to plan, you should be looking at a live TV broadcast, being streamed off to your hard drive and decoded out to your video card. The only thing missing now is program guide data – let's get some of that happening.

Program guides

TV program guides in MythTV are handled by XMLTV, a framework with a standardised method for fetching guide data. Follow these steps to install the Aussie listings grabber and integrate it with MythTV:

1. Install the XMLTV package and libraries – Debian's 'xmltv' package will do nicely.

2. Grab the tv_grab_au script from 'users.on.net/~manser/dvb/tv_grab_au'

▲ **The MythTV frontend, where all your sordid TV fantasies come true.**

3 Edit the script and configure it for your region. Open the tv_grab_au script in a text editor and scroll down to the 'pick your region' section. Uncomment (delete the '#' symbol) the line for your region, and make sure the other regions are all commented. Do the same for the 'source' value – for standard digital broadcasts you will need to uncomment 'freesd'.

4 Install the script:

```
chmod +x tv_grab_au
sudo cp tv_grab_au /usr/local/bin
sudo mkdir /var/local/tv_grab_au
sudo chown mythtv /var/local/tv_grab_au
```

5 Re-open the MythTV setup program and enter the Channel Editor. Open each channel in turn, and enter the XMLTV ID for that channel. These are made from the source, region, and channel number values, with 'd1.com.au' on the end, so 7 Melbourne would be 'freesd.Melbourne.7.d1.com.au'. Now is a good time to remove any unwanted channels from the channel list. To delete a channel, select it in the list, hit M, and select Delete.

6 Editing the channel configuration can sometimes reset the starting channel value, so go back in to the Input connections section and make sure the starting channel is still set properly.

7 Exit the MythTV setup, and run an initial listings fetch with this command, as the mythtv user:

```
mythfilldatabase
```

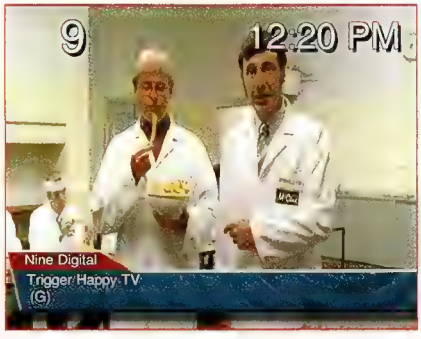
Grabbing the data will take several minutes. Once it's done, re-open the MythTV frontend and check the Program Guide – it should be full of program information.

If some channels come up but others don't, you may have some incorrect XMLTV IDs – you can double-check the exact values by checking the start of the '/var/local/tv_grab_au/guide.xml' file.

The final step is to make sure the listings are updated each night. The Debian MythTV packages add a cron job to do this for you, but otherwise you can enable automatic downloads through the frontend, under General settings.

Using MythTV

MythTV's interface is quite easy to use for the most part, but some aspects, particularly key bindings, aren't obvious at first.



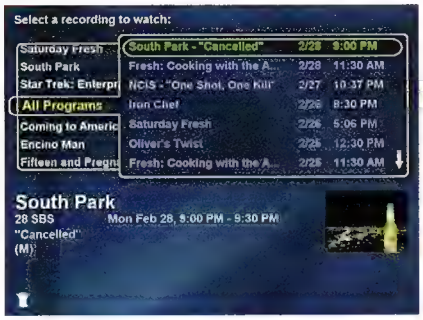
When watching TV, use the up and down cursor keys to change channels, and left and right to rewind and fast-forward through the live TV buffer. Adjust the volume with the '[' and ']' keys. To switch between the various 16:9 and 4:3 scaling modes, handy for expanding digital's widescreen signals to fill a normal TV, use 'W'.

To view the TV guide, hit 'M' to bring up the OSD menu, and then select 'Program Guide'. Navigate around the program guide with the cursor keys. To schedule a recording, select the program and hit enter, then select your recording options.

To watch recorded programs, exit back to the main menu, and then select Media Library/Watch Recordings.

More in-depth recording options, including program searching, are availabe under Manage Recordings.

The Utilities/Setup menu contains a whole bunch of goodies to tweak, including themes and fonts, and various other system settings. So you can pretty much personalise your MythTV experience, if that's something you feel like doing. Otherwise, the standard theme is fine – unless you find the colours too blue, in which case your head might explode.



Heavy Water Reloaded

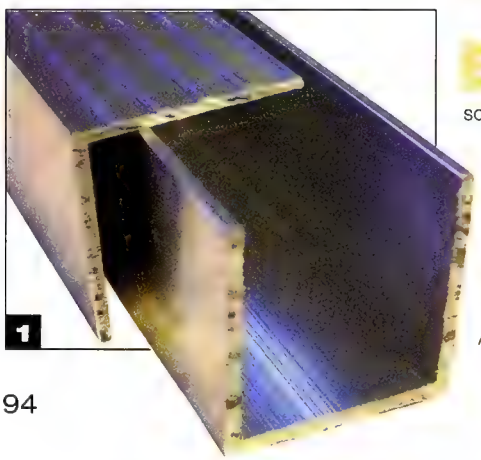
Ron Prouse responds to your FAQs on the ubiir popular Heavy Water Project.

Just after *Issue 50* hit the streets, there was a sudden rush of email regarding a project case from the annals of 2002, the Heavy Water Project (HWP).

It seems that quite a few people had either forgotten or were not acquainted with this shiny, glowy case-mod from more than half an *Atomic* lifetime ago, and seeing it in all its glory via the cover disc archives has once again raised interest in some of the mods that it contained.

As a few years have passed since this case was 'top of mind', answering some of these questions meant going back and looking at the original project log for answers and, just like meeting an old friend, the memories started to flow. Amid the comments of, 'Wow, that really *was* cutting edge' and, 'It still looks hardcore today', we realised that there was a lot of information and detail that was left out of the original tutorials – mainly due to space restrictions of such an intensive mod being completed over four issues.

So, the decision was made to pick out three of the most FAQs, and reload those tutorials with a little more detail and some better pictures this time around. If you missed the original you'll find the HWP in *Issues 17-20* on the *Atomic* Archives CD 1 bundled with *Issue 50*. Read along and enhance the original project with the following expanded tips.

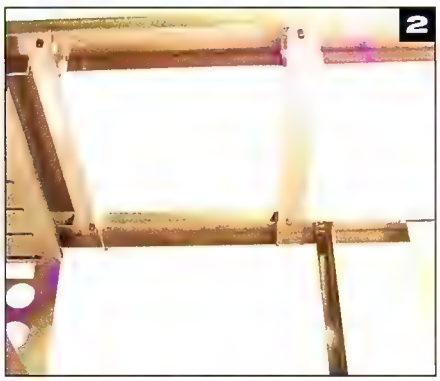


The PowerPole

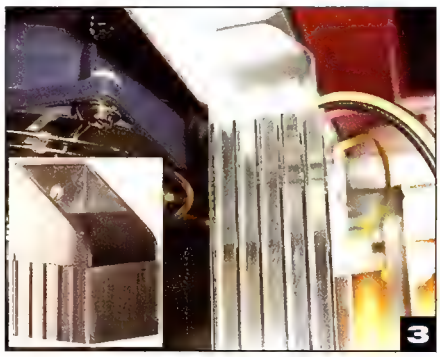
1 The quest for the 'wireless-case' look led us to creating the ultimate structural mod for hiding cables, the PowerPole. The concept was to have the aluminium 'tube' large enough, and positioned in such a way that all of the essential wiring could be easily routed through its length and then run out to the peripherals. The two main components were a 25 x 25mm U-section and L-section made of aluminium stock, sourced from Bunning's Hardware for a few dollars.

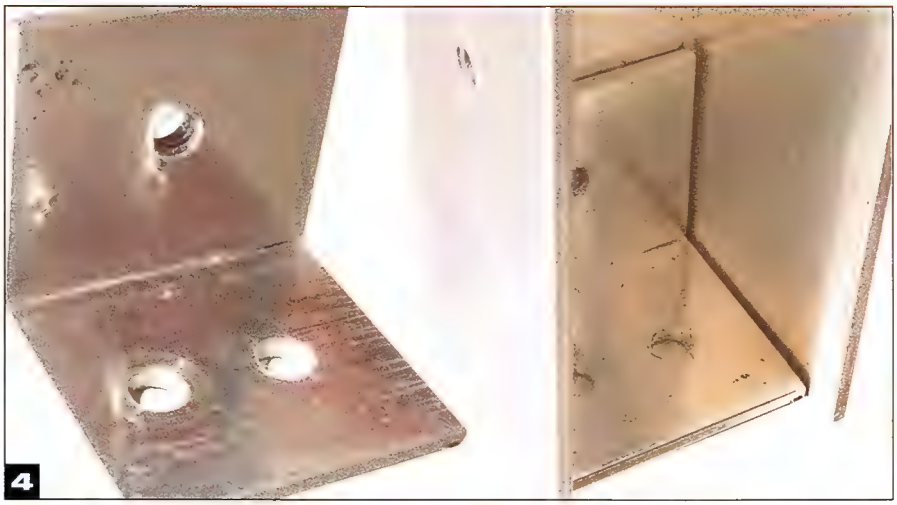
2 Securely mounting the PowerPole at the top and bottom of the case is essential, so the first step is to create some locating points. The critical thing to establish is the distance back that the PowerPole needs to be from the front of the case chassis, to allow room for optical drives, radiators etc, and create a top mounting point. In the HWP case we had already added additional fan-mounting brackets for a top blowhole that were found to be perfect for this task, however attaching a single L-bracket across the top chassis rails using 1/8in rivets is a straightforward affair, especially if the top of the case has been removed. With the L-bracket in place, drill a 4mm hole in the vertical side of the bracket at the required position for the top mount.

3 The next step is to cut the U-section to length, allowing an additional 1mm or so for height adjustment. The top of the U-section should be cut on an angle, as this will make it easier to route wiring into the tube once it is mounted into its final position. As visible in the insert, a 3mm mounting hole is drilled in the centre of the U-section, corresponding with the hole in the top mount. A 3mm screw and nut is used to attach the



U-section to the 4mm hole in the top mount, which means that there is up to 1mm adjustment available in each direction on the vertical plane, aiding in the final alignment of the PowerPole. At this point the L-section cover plate can also be cut to length, approximately 25mm shorter than the U-section so that the top opening is large enough to pass the wiring loom through easily. The U-section is positioned so that the open side faces the front of the case, for two reasons. Firstly, any wiring that comes out of the PowerPole will exit via the 'blind-side' so that it is not too obvious, and secondly, so that the cover-plate is easily removed through the left hand-side cover. To run any wiring out, all you have to do is cut a slot in the back side of the U-section, fit a grommet over the wires and slide it all into place.





4

For the bottom mount, a 23mm long piece of the U-section is cut into an L-bracket, and drilled to accept either two rivets or screws to attach it to the case floor. The two mounting points will help stop the bracket from being able to rotate on its axis, and add to the structural rigidity.

In this example, there is a hole in the upright section that has been drilled and tapped to accept a 3mm screw – this will be used to attach the bracket to the inner section of the pole – although a rivet would be just as effective. Location of the correct spot for the bottom L-bracket is best done with the top mount in place and the bottom L-bracket assembled into the U-section. Getting the alignment right is either a matter of carefully replicating the measurements from the position of the top mount onto the bottom of the case, or using a spirit level – this step is critical, as the finished product will look shit if the PowerPole doesn't line up with the rest of the case chassis on both the vertical and horizontal plane.

5

If the case floor is flimsy or you are trying to create some additional structural rigidity, then a step worth considering is the use of a 50 x 50mm sheet metal section under the bottom of the case as a large 'washer' – smearing the contact surface with a thin layer of silicon prior to attaching the L-bracket will prevent vibration and strengthen the bond considerably.

With the U-section in place, mark the position for the holes to secure the L-bracket to the floor and drill them to accept either 3mm screws or 1/8in rivets. Attach the bracket (and floor 'washer' if used), and assemble the inner tube of the PowerPole. If the case floor is flat, and the end of the U-section is cut at a true 90 degrees, then the finished joint should be perfectly flush. If there are slight gaps, don't panic as they will be partially hidden when the L-section cover plate is fitted.

With the U-bracket mounted in position, the final step in the structural work is to attach the L-section 'cover'. With the L-section held firmly in place against the U-section, drill a pilot hole through the two sections using a 1.7mm drill-bit. Open up the outer hole to 3.5mm and countersink it with a larger bit, and then cut a 3mm thread in the inner section with a standard pitch tap. This will let a standard 3mm 'computer' screw pass through the outer skin and secure to the inner fitting. In the HWP, the cover plate (L-section) screws were replaced with Lian Li thumbscrews, so that the 'tool-less design' philosophy was retained and a consistency of style maintained throughout the finished case.

6

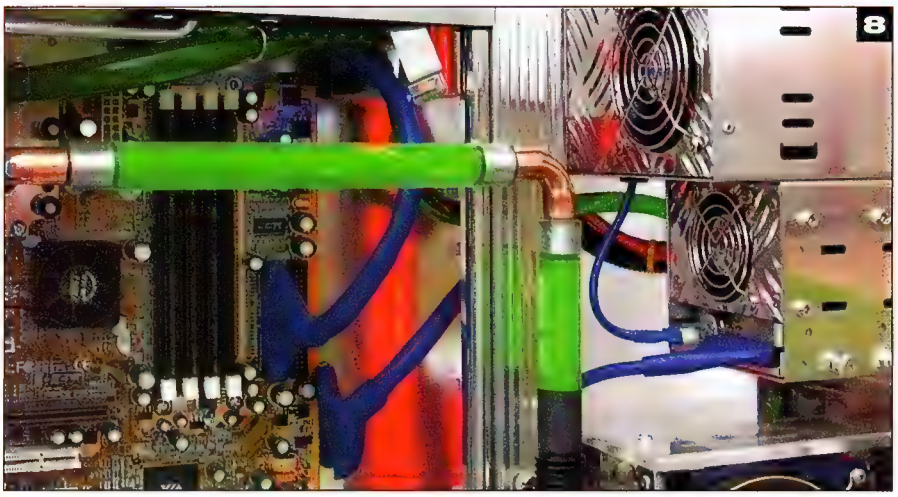
With the structural work complete, the next step is to cut out the ports for the cables and wires to pass through. Depending on where the wires need to be routed, the pass-out holes can be made either in the 'blind' side of the U-section or the inner-side of the L-section, either way the method is the same. Locate the position of the required pass-through, and drill a 12mm hole. Using a hacksaw or nibbler, slot the metal so that the hole is elongated out to the open side. Rubber grommets can be used to protect cables from possible damage where they pass through the cut-out, and cable sleeving can be used to achieve an even more professional finish.

7

Viewed from the side of the HWP case, the orientation of the PowerPole placement is more obvious.

The rounded section on the left side of the PowerPole might be of interest to anyone with a water-cooled PC. When we were initially picking up the aluminium stock, we spotted a piece with a profile that was an 'open P' shape. It was the perfect size to conceal a 240V power cable – ideal for hiding the Eheim pump cable. It turned out that not only was it the precise size for a 240V flex, but a rounded IDE cable would also fit with a bit of a squeeze.

With the pump cable hidden from view, there



was now another mounting point for a privacy screen, the sheet-metal plate that conceals all of the wiring between the PowerPole and the PSU mounting bracket. This screen will conceal all of the wires where they exit the power supply, and provide a home for the relay that controls the pump switching, but still allow airflow around the top of the case. All that was required here was to cut two lengths of L-section stock to reach between the PowerPole and the PSU, allowing a little extra at each end for a 'tongue' that would attach to the mounting points with 1/8in rivets. With the framework in place, a piece of the aluminium left over from cutting the side-cover for the window was used as the plate, measured and cut to the required dimensions of the screen, and then riveted to the frame.

LED Tube

'Oh, great! A dead cathode tube!' is probably not the first reaction you will have when looking at the sad remains of a case light, but it seems that the LED light tutorial has given some of you inspiration!

Sure, the actual cathode tube may have died, but the plastic tube and mounting blocks are still intact, and they can be recycled to create a light fitting that has more flexibility than any of the 'off-the-shelf' items. You can chose any length that you might need for that special project!

For example, the HWP had a blue LED light in the recessed section of the backplane, next to the I/O panel, using 5 LEDs over a length of 150mm.

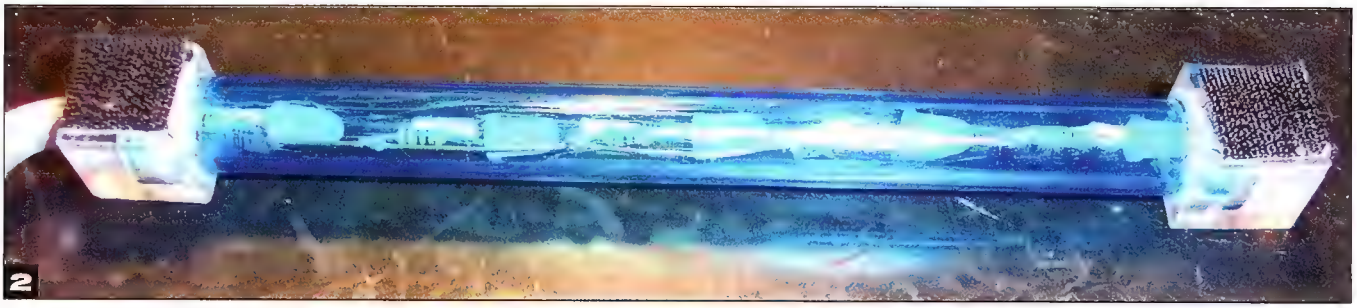
To recycle the cathode body, start by gently prising one of the end caps off, preferably the one that has the hole for the wiring to pass through. The most successful method of doing this is to gently clamp one of the end-caps in a vice, warm it up with a hairdryer and twist the tube out of the cap when the glue has softened. Once the cap is removed you can carefully remove the dead cathode 'globe', and then cut the empty tube to the required length with a hacksaw. One word of warning – make sure to allow for both of the caps in the overall length when measuring.

The next step is to make a run of 5 blue LEDs in parallel (each with its own resistor – so if one light blows, the others don't). The LEDs used are high intensity, water-clear items from Jaycar (Cat# ZD-0182), and the lenses were sanded opaque with 1200 Wet'n'Dry sandpaper to increase the light diffusion. You will only need to insulate one power rail for most of its length (the positive and negative just need to be kept separate), as the LED assembly will be mounted inside the non-conductive acrylic tube. It is important, however, to make sure to insulate both wires well before they exit the end-cap, to avoid short circuits against the case chassis.

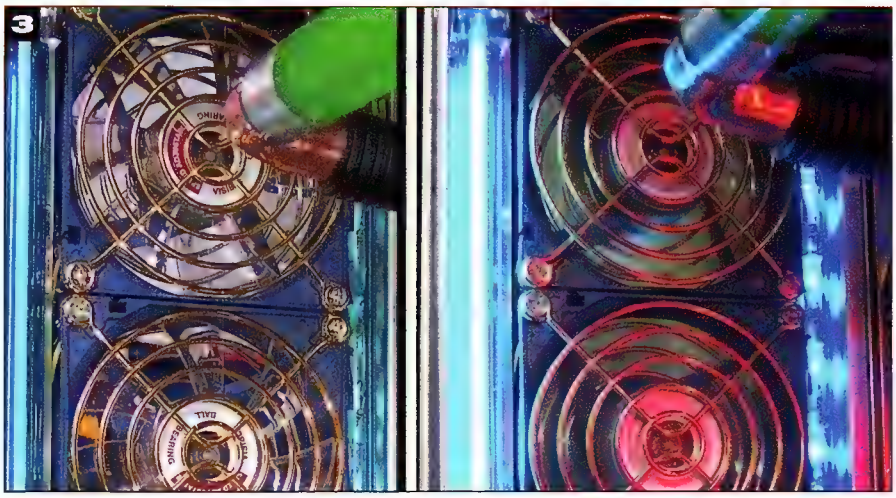
2 After attaching a generous length of insulated lead-wire to the LED power rails, a small knot in the wire is used to stop the LED rails being pulled out through the hole in the end cap. Shrink tubing has then been used to secure and protect the power connections where they exit through the acrylic block.

To keep the LED assembly secure from movement inside the acrylic tube, the LED furthest from the connection end (RHS) should be glued inside the body with epoxy glue or silicone sealant during final construction.

Once the LEDs have been inserted, the end-block is glued back on with an acetone-based cement, making sure that the flat sides of the two square caps are attached with the same orientation. The finished light was mounted with Velcro tabs.



3 As a final step, the insulated wires have been routed through a section of aluminium tubing, across the top of the I/O plate and out through the motherboard tray. Now, as these LEDs are about $4 each this is not a cheap way of creating a case-light – a 30cm cathode is a similar price – but remember that this is a custom length unit, there is no inverter required, and it has a much richer colour than a cathode tube.

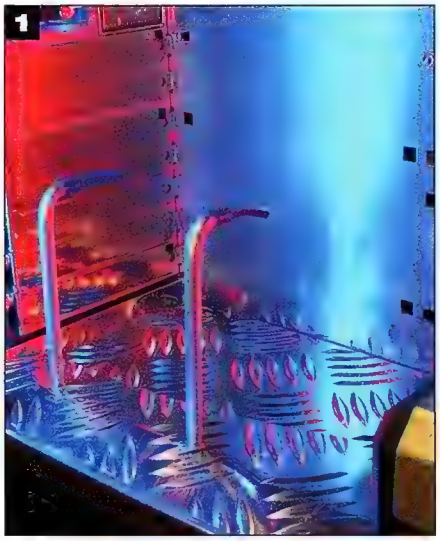


Checker Floor

1 Although the 'false floor' concept has been covered several times over the past two years, the use of aluminium checker-plate is one of those subjects that raises a lot of questions.

Consider that reflection is the best way to maximise the effect of case-lighting, and this is one of the best methods to achieve just that – polished aluminium checker-plate. The raised sections will pick-up and reflect any light source in your case, and provide additional highlights if you have more than one colour 'colliding', such as the red and the blue used in HWP.

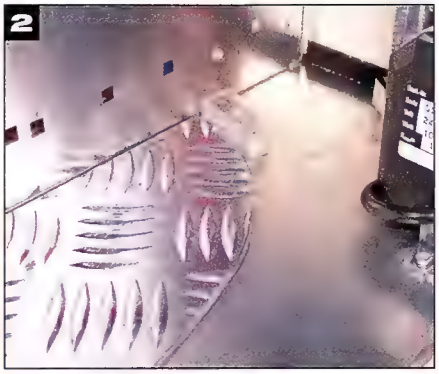
In this example though, the checker-plate had another function as well – using two levels to conceal wiring and cables. Look closely and you will notice that the top level is 15mm higher than the lower along the centre of the case. The concept here is that all of the wiring, temperature sensors and audio cables can be run down through a PowerPole, concealed under the front floor level, and then run out through the gap between the levels to connect to the motherboard, sound card, etc. In some of the final pictures you will see that the audio cables have been run through 7mm aluminium 'riser tubes', screwed into the front floor, to further hide any wiring clutter.



2 The first step is to cut a lower level section, and attach it to the case floor using either epoxy glue or mechanical fastening. To raise the front section we made up a series of three 15mm thick spacers from acrylic off-cuts, attached around the edge of the lower floor (from underneath the case) with screws and countersunk nuts. When the front, upper level is installed, it will be attached securely to these spacers with countersunk fan screws.

3 Rather than have a flat floor on the outer edge of the upper section, the checker plate has been folded downward on a 20 degree angle along a 40mm margin, so that the outer edge would sit flush along the length of the side-cover opening and then slope upward to the flat section in the centre of the case. A bead of silicone sealant was run across the case at the contact point with the upper floor, to stop any metal-on-metal vibration.

The upper floor was also shaped to fit around the water pump and PowerPole, helping to further conceal cables and wiring.



4 As well as being great at reflecting light, the false floor is also good for hiding them! Two Laser LEDs were mounted under the floor to provide a wash of colour across the lower floor and motherboard. All of the wiring leads have been sleeved with blue PVC tubing so that they are a uniform colour, and therefore less noticeable.

As mentioned, two aluminium riser tubes were used to make a feature of the audio input cables rather than try to hide the obvious!

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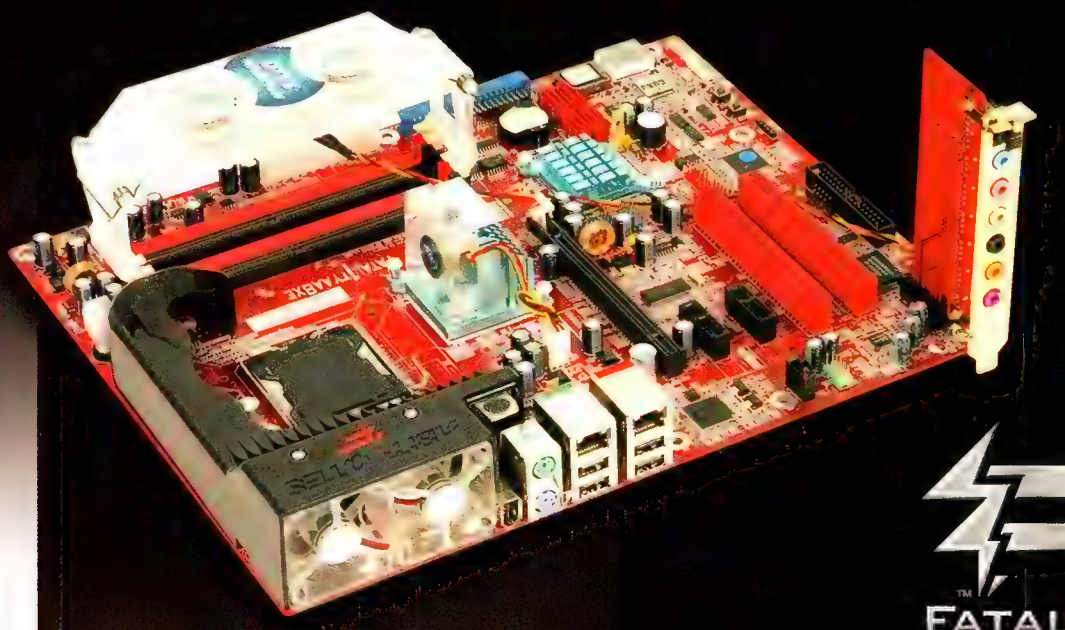

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gameplay

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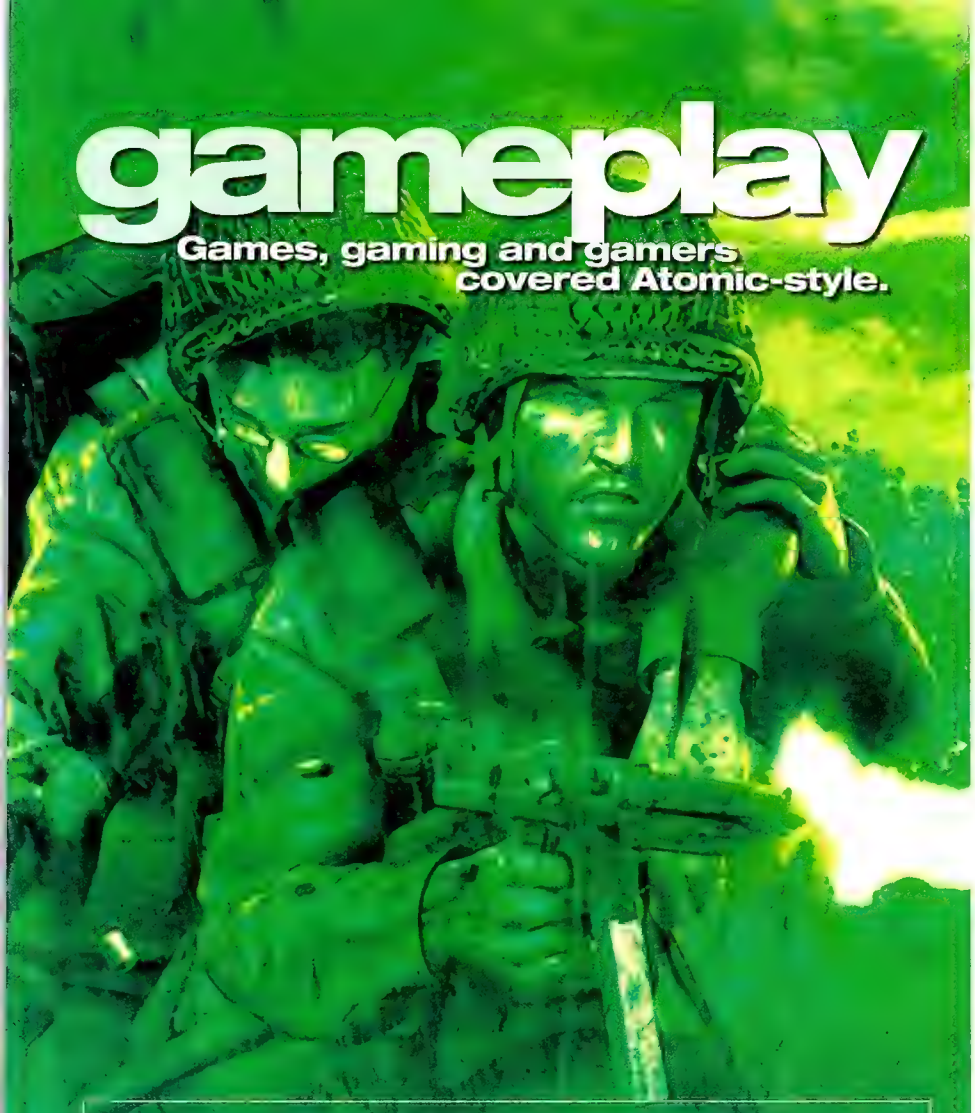

Us grown-ups have a bunch of things to direct our maturated angst at. Animal testing, privacy, the internets. There's no shortage of fights to fight.

Believe it or not, developers today face their own battle over their basic creative liberties.

There is a disease festering in the publisher/developer relationship. This disease dishes out melancholy to developers in the same way Marburg hands out hemorrhages: Painfully.

Publishers are scared of not owning intellectual property. It makes them queasy. This desire however does not coincide well with a developer's want to own its creations.

Every publisher is guilty of holding IP in its proverbial Force Grip. EA does it, Vivendi is getting into the swing, and it won't be long before Ubi pushes out Splinter Cell 4.

Creative control is an artist's right – and a damn important one. We push more libertarianism into the world as Generation X than any other generation that has come before us.

Recently I had an opportunity to talk to Meridith Braun. Meridith works at Digital Extremes, the studio responsible for most of the Unreal titles. She was kind enough to reveal that DE is currently working on a fantastic game called Dark Sector.

DE however has yet to secure a publisher because, well, everyone it approached has demanded the IP.

I don't know about you, but that pisses me off. It really, really does.

So, what can we do? Support independents like Irrational and Digital Extremes. Buy their games, spread the word, but most of all, love them.

Whatever you do, do it today. Do it *now*.

Logan wants to play spin the bottle, help him out!

thismonth

gamereviews

shortcircuits

Fans of Heroes of Might and Magic will be happy to hear that the fifth iteration of the series is in development. Nirval Interactive is behind the reins of the new strategy title. The game will feature revamped 3D graphics and six races for the player to choose from.

Ghost Recon 2 for the PC has been canned by Ubisoft. According to the official statement on the website (**www.ghostrecon.com**), the PC version was drawing too much manpower away from development of Ghost Recon 3.

That crazy Luigi Auriemma is at it again. If you're not familiar with Luigi, he's a security guru intent on finding and exposing flaws in popular, and not so popular games. The latest to fall under his probing are Jedi Knight: Jedi Academy, which features a nasty buffer overflow, and Call of Duty, plagued by a server crash flaw. At the time of writing, no patches had been released to address the problems.

scanner

Game, industry and online news for the enthusiast

Back to Black Mesa

Half-Life: Source done good.

When the first Half-Life came out, it really did rock. The graphics, the gameplay and the characters with that level of detail were unheard of at the time. So, when Source came out, Valve was nice enough to port this beloved title into its new engine.

Problem is, it was a piss-poor effort.

Leave it to the modding community to do what Valve couldn't do. Enter a team of fresh faces to get Half-Life into Source, the way it was meant to be. We managed to get a hold of Jon 'Kalashnikov' Dominski, the guy behind the mod, called Black Mesa: Source.

'When the media shots and information about Half-Life: Source were released, we quickly realised that Valve wasn't going to be redoing the game on Source and thus Black Mesa: Source was founded,' explained Dominski.

So far, not much solid work has been done on the project itself, Dominski estimating around 10 percent of the project is complete. That's not so bad, considering all the work the project involves. The team plans to rebuild the entire game from scratch, using the original Half-Life levels and models for reference only.

'With Half-Life: Source, it was a simple port and nothing had changed except for some bump mapping, lighting and water effects. With Black Mesa: Source we are designing our textures to work smoother with bump-mapping, lighting design for each location and designing levels to bring Black Mesa to life,' Dominski said.

'Physics props will be implemented to take advantage of Havok 2 and other such uses of the new and powerful Source engine will find their way into Black Mesa: Source.'

Dominski estimates it will take at least a year to complete the full conversion. We'll look forward to powering through it all again.

ping: Massively multiplying MMOs and more

The MMO market is really going crazy at the moment. A bunch of independent and mainstream developers (well, more likely their owner publishers) have twigged on the fact that the online worlds with monthly paying subscribers is the way to go.

Because of this, scores of MMOs are currently in the works, some a bit more appealing than others. These include Dungeons and Dragons Online which is, as the name says, an online version of D&D (now in alpha testing); Irth Online, being developed by newcomers Magic Hat Software and All Points Bulletin by GTA creator David Jones. Except for the last game, all of these MMOs are medieval fantasy. This genre glut means that only a few will make it past the year mark.

Also in the news is the death of a Legend of Mir 3 player named Zhu Caoyuan over the sale of a piece of virtual property, this being a 'Dragon Sabre'. The poor guy was stabbed to death by a fervent Qiu Chengwei. Apparently there was dispute over the sale of the sword, resulting in the fatal clash of pale nerdy arse. Only in Korea.

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Black & White 2

Best evil monkey

Black & White 2 is Black & White with more of everything, particularly the pretty shader effects. Lionhead Studios has taken everything it learned from the first game and tweaked it for the sequel. Like the original, you're put in the omnipotent shoes of a deity, where it's up to you to nurture, or punish, your devout followers. To help you in your quest to be all that you can be, you get to take care of a giant pet, Tamagotchi-style. It evolves along with your attitude, so if you're a nasty, irritable god whose wrath is incurred on a minute-by-minute basis, then your followers will incur the wrath of your turd-tossing monkey also. The learning and training systems in the sequel however have been overhauled, giving you even greater control over your bestial avatar.

It seems wrong to credit just Peter Molyneux, or even to credit him at all, with the development that has already gone into the title. Suffice to say, the current team has put plenty of effort into B&W 2, and it looks to be incredibly fun as well as extremely gorgeous.

Release date **Late 2005**
Platform **PC**
Developer **Lionhead Studios**
Website **bw2.lionhead.com**

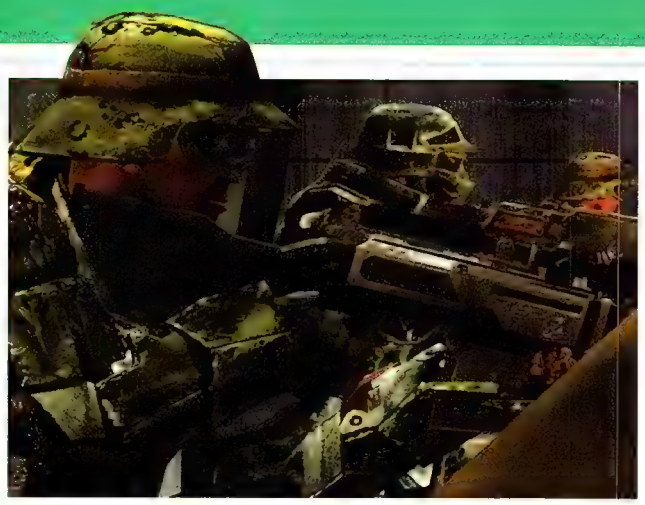
F.E.A.R.

Best glory hole

With a name like that, you're basically guaranteed a game that's going to play with your mind like a psychopath plays with his collection of human fingers. And that's the name of the game, as it were, for Monolith's stunning F.E.A.R. Now that advanced bump-mapping and lighting techniques have grasped developers firmly by their curliest of hairs, it's hard to find a game that doesn't include a glossy character model and a building made entirely of riveted metal. And F.E.A.R. has these. But it also has a freaky-looking girl in a red dress who can toss armed troops around in the same way a gosu CS player throws flash bangs through holes no bigger than a rat's glory hole.

Regardless, F.E.A.R. looks as spooky as it is playable. It promises to be a great shooter, solid thriller and all-round brilliant piece of 3D engine-work, no matter how many glory holes you have to gas.

Release date **Q1 2005** Platform **PC** Developer **Monolith** Website **www.lith.com**



Bet on Soldier

Best merc

Bet on Soldier has a story similar to that of the Unreal series – death equals entertainment. Individual combatants are hired mercenaries that work for one of two massive organisations. Each soldier is paid per kill.

On top of this, people are able to bet on the success of each mercenary, hence the title 'Bet on Soldier'. BoS owes its appealing graphics to six years of research and development, so here's hoping it plays as well as it looks.

Release date **2006** Platform **PC** Developer **Digital Extremes**
Website **www.darksector.com**

Condemned

Best murder weapon

Dark and scary games are hitting us from every angle – luckily they're not as bad as a certain dark and stormy book. Condemned is another Monolith game, and like F.E.A.R., it's a soil-your-pants title. As a forensic specialist, you have to solve a string of serial murders, eventually discovering the identity of the killer. Along the way you'll need to defend yourself against various opponents using nothing but a paperclip and a set of old socks. MacGyver eat your heart out.

Release date **TBA** Platform **PC** Developer **Monolith**
Website **www.lith.com**

Dark Sector

Best dark corridor

For a while there, Digital Extremes was caught in a niche developing Unreal titles. Thankfully, DE has struck out on its own with the recently released Pariah, and is set to continue this trend with the Splinter Cell-like Dark Sector, based on DE's own Sector engine.

Dark Sector was actually announced a few years back, but since then it has evolved enormously. We managed to sneak a peek at the full technology preview, and to say it utterly rocks would be an understatement.

Release date **2006** Platform **PC** Developer **Digital Extremes**
Website **www.darksector.com**

Space Empires 5

Best alien

If you're a fan of Malfador's previous titles, then Space Empires 5 is sure to excite. Taking the age-old space-empiring formula found in games like Galactic Civilizations and Ascendancy, SE5 adds various layers of depth and gameplay missing from more mainstream titles. Ground/space combat and customisation of ships, races and technologies equals unparalleled replayability, and SE5 has it in spades. Be sure to check out the older SE games to get an idea of how complex the series is.

Release date **Q4 2005** Platform **PC** Developer **Malfador Machinations**
Website **www.malfador.com**

PLAYING WITH PATHOGENS

Take a dangerous wasteland, a deadly virus and a narky physician, and you have Pariah. Logan Booker gets treated by Digital Extreme's James Schmalz.

There was a time when Unreal didn't exist, when the only thing we had to look forward to was Quake. Then out of the blue came Epic with this killer, visually stunning title that made id's contribution look like a muddy wash of brown models desperately fighting for screen space. With Unreal, the pace was set for the advance of graphics technology, and it wasn't long before Unreal Championship came into being with support for DirectX, OpenGL, Glide and software rendering.

Although Epic is credited with coding the engine, it's Digital Extremes, founded in 1993, that did the creative work. Up until three years ago, all DE had to its name was a string of Unreal games. Certainly not a bad thing, but DE felt it was about time to explore those hungry creative impulses and strike out alone.

The result? Pariah.

The only prescription...

Funnily enough the original concept of Pariah was for it to be primarily a vehicle combat game. So I'd have to say the entire game concept had some radical changes over the course of development,' says James Schmalz, creative director and founder of Digital Extremes. Schmalz has a number of titles under his belt, including classics such as Solar Winds and Jazz Jackrabbit, as well as Unreal.

'This is often the case through trial and error. You get a prototype up and running quickly to see what works and what doesn't and then build and change things from there. Pariah evolved tremendously from that first concept.'

In the end, Pariah became a first-person shooter with a strong story element. Thrown into the shoes of military doctor Jack Mason, you're out to survive in a wasteland with nothing but a bone cutter and healing stim. If this wasn't bad enough, there's a patient with a virus you have to care for and a bunch of dudes with guns trying to shoot you – something no FPS can do without. The whole situation is topped off by the reason you're in the wasteland to start off with – your transport was shot down while in transit from a prison facility.

Why would your own people shoot you down? What's the deal with the virus? That's up to you to discover.

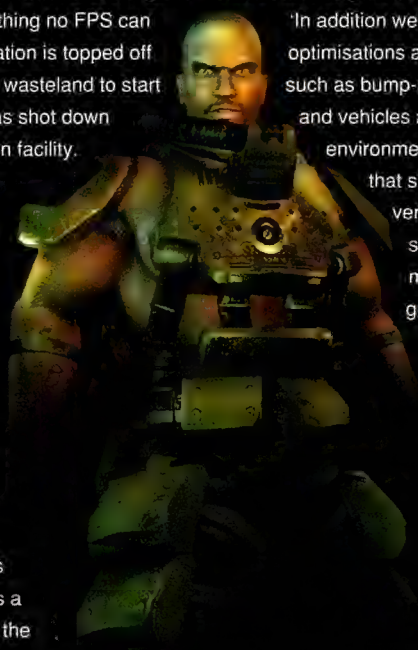
Engine fever

In order to focus on the design of the game itself, Digital Extremes decided to stick with what it knows, this being the Unreal engine. Pariah uses what Schmalz describes as a 'highly modified version' of the technology used in Unreal Tournament 2003. Having had the tech to play around with for so long, DE has had plenty of time to add some great stuff, including everything it's implemented since working with the engine.

'We've added a load of stuff into the engine including Havok physics which you'll see on the rag dolls, vehicles and destructible objects in the environment,' says Schmalz. Havok replaced the old Karma physics system, Schmalz citing Havok as being more robust and fully featured.

'In addition we've done a lot of optimisations and graphic enhancements such as bump-mapping on the weapons and vehicles and some of the environments, shader effects that show off heat-shimmer, vertex shaders where you'll see the leaves on the trees moving and falling to the ground and loads of other cool stuff.'

Even more interesting is the fact that Pariah is being released on PC and Xbox, and development has occurred in parallel on both ports. Players can expect



More pouches than a herd of kangaroos.

Unsuprisingly, the majority of folks in Pariah won't be the happiest you've met.

higher resolution textures (as well as higher resolutions) for the PC version, thanks to the boatloads of memory it has over the Xbox, as well as the odd bit of eye candy made possible because of the extra power that's available. On the flip side, development on the Xbox was much simpler due to the standardised nature of the hardware and although it may not look as great as the PC version, it's still very much a gorgeous game.

'There's not anything specific that we did on the Xbox because of this but it certainly takes a lot of work time out of the equation when you don't have to compatibility test for every hardware configuration you can come up with on the PC,' says Schmalz.

Extreme design

Pariah has a lot going for it in terms of game design. Perhaps the two standout features are the game's 'weapon cores' that allow the player to upgrade their guns, and the in-built MAP editor.

Using weapon cores scattered throughout the game, the player can make improvements to their arsenal by increasing firing speed, damage, and even adding features like homing rounds and heat vision. Almost all wieldable objects can be upgraded, including the healing stim, which provides a bonus to your maximum health, among other things when improved. According to Schmalz, the idea for the weapons cores remained consistent throughout the game's development.

'We did go through a lot of iterations of different upgrades to see what worked, what was fun or not as well as the interface and interactivity on how you would pick them up and apply them; but in general the concept stayed pretty true to our original idea for them,' he explains.

'The weapon upgrades are extremely cool. They took a lot of work on trying to make them fun and we're really proud of how they turned out.'

Then there's the MAP editor. It's quite a feat of programming, considering it takes almost everything you can do in the Unreal map editor and puts it into an easy-to-use tool.

Players can raise and lower terrain, add buildings, spawn points, trees and bridges with little difficulty. These maps can then be used in online play, significantly increasing the longevity of the game.

'The whole idea behind making the MAP editor was to make sure it would be easy to use and understand as well as be something powerful that offered a lot of choice and functionality. From there we formulated how we could technically put it together; surprisingly it worked out a lot faster and better than we even imagined,' says Schmalz.

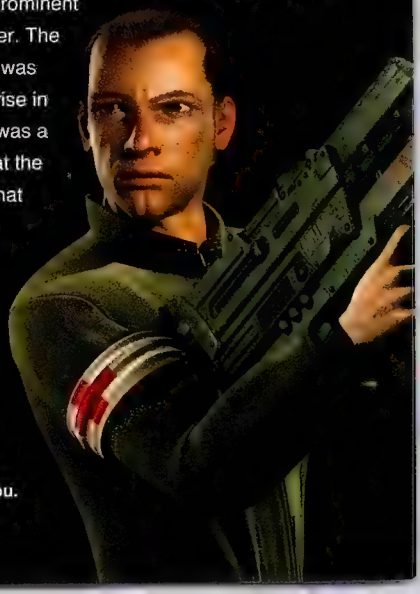
Apparently the only limitation of the editor is the lack of bots, which according to Schmalz would have taken a long time to implement.

'It's always more fun to play against real people anyway so we don't really see this as too much of a negative,' he says.

Outbreak

Although Schmalz comments that there's always room for improvement, DE is pretty satisfied with the quality of the final game and what it has accomplished with it.

While the original vehicular-centric vision for the game changed dramatically, Pariah still features jeeps, bikes and tanks, which are especially prominent in multiplayer. The MAP editor was also a surprise in the end. 'It was a small idea at the beginning that turned into one of the major features of the game,' says Schmalz.



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That's a lot of helmet hair.

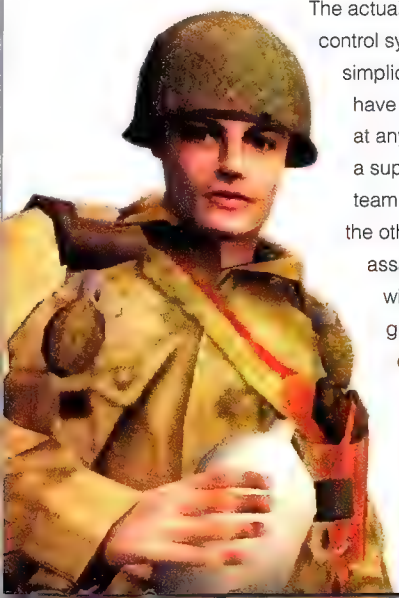
Brothers in Arms: Road to Hill 30

Darren Ellis finds this more pleasant than when he stumbled upon 'Arms in Brothers' on the internet.

Brothers in Arms: Road to Hill 30 (BIA) is a console port, but one that's unusual in that it doesn't feel like one. Graphically, this game pwns the tired looking Medal of Honor: Pacific Assault and while it doesn't really define the genre it certainly ups the ante in some regards.

Yet again BIA is another first person shooter set within World War II, but this one has the advantage of well implemented squad-based tactics. Unlike some dire squad games such as the abysmal Devastation, in BIA it is integral to completing the game, and without it you're stuffed.

That said the squad system is based on a pattern of suppressing fire, flanking and attacking. The game turns into an exercise of suppress, flank, and attack that can get a little repetitive, but at least there's enough variety in the maps for you to try many varieties of this theme as you reload and replay.



The actual squad control system is simplicity: you have two squads at any time – one a suppressing team with rifles, the other an assault team with machine guns. Holding down the right button brings up a ground-based target that countors to the terrain as you mouse look. Letting go either sends your selected troop to that area or tells them to lay down suppressing fire at the enemy, and left clicking sends the troops in an all-or-nothing assault on the target. Holding down shift tells them to return to you.

Aside from that and a not very helpful 'situational awareness view' (which allows you to pause the action and see the status of your troops, and your troop's positions), Brothers in Arms is another FPS in the MOHAA and Call of Duty vein.

Graphically the game is excellent, although some terrain elements become repetitive, but the overall level design, the awesome audio, the fabulous character design and the voice-talent really help immerse you in the story. Which is good because it's based on the true one of Sgt. Matt Baker and the soldiers of the 101st Airborne Paratroopers who parachuted into Normandy just before the D-Day landings. BIA covers the first eight days of his experience as you take control of him and his team and their inexorable crawl to, unsurprisingly, Hill 30.

Multiplayer is interesting as it pits you and a mate (each with yourself and squad to control) against two other human players. Squad-based multiplayer is fun, but the single player aspects of this game shine.

Brothers in Arms is a short game which is a pity because it's immensely enjoyable, but overall the pros way outweigh the cons. That it's immersive, fun, has lots of bonus material to unlock and is simple to grasp negates the rinse and repeat of the gameplay.

PC

Developer **Gearbox Software**
Website **brothersinarmsgame.com**

Recommended
2.5GHz CPU; 1GB RAM; 5GB hard drive space

VERDICT

Awesome graphics, sound and atmosphere. The brutal opening is immersive.

Repetitive gameplay and terrain. All in all, a bit too short.

score **8.0** OUT OF 10

DIGITAL EXTREMES REDEFINES THE FPS GENRE

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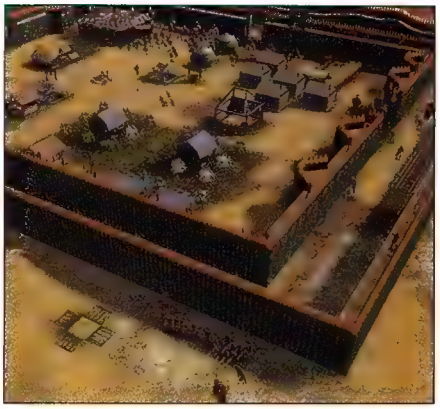
Stronghold 2

David Kidd pours some boiling gong on his enemies in Firefly's latest castle-building romp.



Conceptually, the Stronghold series has everything going for it. Firefly's original game was a fresh take on two overdone game genres – RTS and city building – but centred on the astoundingly underutilised game concept of castle building. Firefly didn't hold back in flexibility either, bundling in campaigns based on either sieges or the economics of castle building. Additionally, the sandbox modes combined with the expansion, called Crusader, means no one could possibly say that Firefly wasn't delivering on its promise of the ultimate castle simulation.

So, it's with great expectation that we look at its sequel. The first thing to go is the 2D interface, which aside from looking pretty, offers some much needed features for any castle-builder. You can now zoom and pan around your castle easily, and a single press of the spacebar snaps you into a top-down mode to better lay down your walls.

Unfortunately, while the 3D flexibility was clearly given much attention, the same can't be said for other areas of the interface. Combat control is clunky, and if you're expecting contemporary RTS controls, like double-clicking to select all unit types, or mouse gestures for formations, you'll be disappointed. Other interface standards, like tooltips and help, are strangely absent, which means far too much time is spent flicking through manuals and help screens – unforgivable for such a complex game.

Once you're comfortable with the interface, the game shows its true colours. Due to the poor AI (which unfortunately seems to be even more diabolical in the sequel), we were always more fond of the economic and building mode, rather than combat, and Firefly has kicked it up a notch. The game map is now broken up into estates which, once 'bought' with honour, can funnel needed goods back to your castle. The classic economic model has been expanded to include more resources, and you'll need to be on top of every single resource to ensure your city runs smoothly.

Finally, the castle-building aspect itself has been greatly improved. The 3D engine has delivered some stunning flexibility in how you build your castle, with even more defensive structures. Your castle walls flow around the 3D terrain to produce a more organic feel to your stronghold, and you can further take advantage of mountains, chasms and other natural defenses.

Ultimately, the charm of the original is left intact, and while there are some unfortunate interface and AI shortcomings, this is a great addition to the family. While it isn't as ground breaking as the original, we credit Firefly for not messing with the formula, and even expanding on its strategic elements.

The main seller is the 3D wrapping, but it's just that. Look past it and appreciate the interwoven economy and high strategy, and you won't be disappointed.

PC

Developer **Firefly Studios**
Website **www.fireflyworlds.com**

Recommended
2GHz CPU; 512MB RAM; 64MB graphics card; 2.5GB HDD

VERDICT

Strategic overhaul; multiple play modes; castle-building flexibility.

Combat, interface and AI are left wanting. Very similar to the original.

score **7.0** OUT OF 10

Jade Empire

Logan Booker gets his Chi on.

XBOX

Developer **Bioware**
Website **jade.bioware.com**

Players **1**
Other platforms **No**

VERDICT

Awesome, culturally rich story and characters, fighting styles and realtime combat.

Can be overwhelming at times, poor style choices makes the game harder.

score **9.5** OUT OF 10

Ancient oriental history has always held me in fascination. From *Journey to the West*, on which the *Monkey* TV series is based, to the *Book of Five Rings* by Miyamoto Musashi, these texts are some which you must simply find time to read, like Homer's *Illiad* or *Football: It's a Funny Old Game*.

What makes them special, apart from their creamy, delectable complexity, is an unfathomable epic quality. Ironically, this overwhelming dose of illustrative fiction can be hard to understand if you've been weaned on Goosebumps or Babysitter's Club. Not that I've ever read any of those.

Bioware's Jade Empire has somehow managed to take the best elements of these texts and combine them into an extremely accomplished Xbox title. Set in a quasi-medieval Chinese world, spiced with dashes of Japanese cultural flair and complemented by magic and machine, Jade Empire sets itself apart from other role-playing games with its story and richness alone.

The game begins in Two Rivers, a small village on the outskirts of the empire. Your character is the top student in a martial arts school, led by the wise yet mysterious Master Li. From here, it takes little time for the story to gracefully unfold and your world to be turned upside down.

Jade Empire mixes a variety of gameplay elements from Bioware's previous RPG games, like Baldur's Gate, and gels them together with a much-sort-after addition by players of these games – realtime combat. All the choices you make happen by the seat of your controller.

It is this combat that drives the game. Three stats, Body, Spirit and Mind regulate your three resources, Health, Chi and Focus. While Health is self explanatory, Chi is used to power your magical abilities while Focus determines how well you utilise melee weapons. Focus can also be used to slow down time and Chi to regenerate Health.

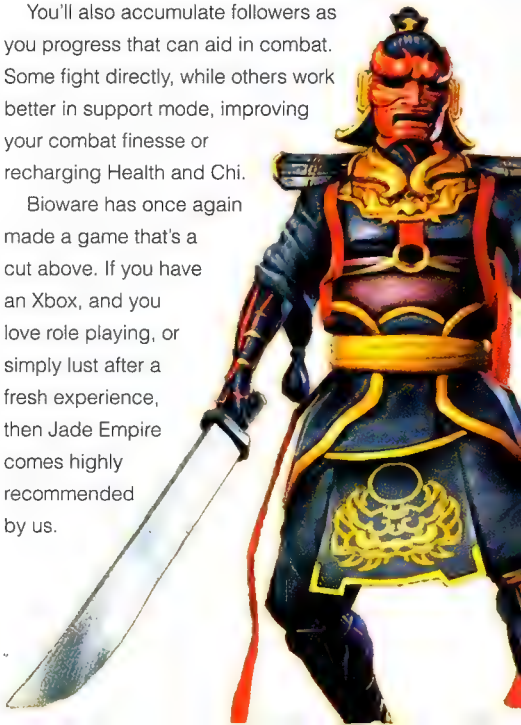
This system is fleshed out by Styles that focus on marital combat, magic, weapons or impairing effects.

The Heavenly Wave style, for example, lets you slow down your opponent, while the Tempest magic style can hold enemies in a whirlwind and dish out damage. As you level, you're given points to distribute to your primary stats as well as these styles.

It's important to have a good selection of styles from all areas, as the game can be almost impossible at times if you focus on just one or two.

You'll also accumulate followers as you progress that can aid in combat. Some fight directly, while others work better in support mode, improving your combat finesse or recharging Health and Chi.

Bioware has once again made a game that's a cut above. If you have an Xbox, and you love role playing, or simply lust after a fresh experience, then Jade Empire comes highly recommended by us.



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Act of War: Direct Action

Logan Booker gets some action.

Direct Action lets you blow things up indiscriminately – just like the real Army.

PC

Developer **Eugen Systems**
Website **www.atari.com/actofwar**

Recommended
2GHz CPU; 512MB RAM; 128MB video card with T&L.

VERDICT

Great difference in sides; credible plot; solid single-player campaign

Not original enough to pull people away from C&C; acting is a mixed bag

score **8.0** OUT OF 10

Dale Brown is considered up there with the likes of Tom Clancy, and even Alistair MacLean, as far as thriller/suspense writers go. Although I wouldn't describe *The Tin Man* as a pulsing dynamo of action and turbulent real world politics that burrows into my very soul and displaces my world view, I do consider it a decent piece of writing. Brown's most defining quality is the blend of reality and fiction that permeates all his works. Act of War: Direct Action is the first attempt by a publisher – Atari – to take Brown's work and mould it into a game. Instead of taking the easy route of a point-and-click adventure, developer Eugen Systems has concocted a realtime strategy that brings much to the table.

Like Brown's books, Direct Action has a semi-believable plot. The price of oil has hit ridiculous levels thanks to an energy crisis, the US economy is taking a beating and certain unruly terrorist groups have decided to act in the country's time of weakness.

Using both the forces of the US Army, and special group known as Strike Force Talon, it's up to you to put a stop to these shenanigans. Unsurprisingly, as you progress, it becomes known that a mysterious organisation known as the Consortium is funding their nefarious efforts, and it is here that things go pear-shaped.

The game proper is traditional RTS fare, with the odd injection of originality from time to time. Although you only play as the US Army and Strike Force Talon in the single player, the Consortium is available in skirmish and multiplayer. The units of each side vary greatly, with the US Army relying on brute force and power, while the Consortium favours large numbers. Resources are gathered by building oil derricks next to wells, however, players can seize banks and take prisoners of war to generate more funds.

Unfortunately, Direct Action delivers unyielding hordes of actors performing from above average all the way to downright woeful. Although we've come a long way since the days of C&C, Direct Action really ends any argument that FMV adds to a game. It still doesn't, and although the implementation is well done, Direct Action takes itself too seriously to make it great.

There's much to be said for the graphics of RTS games these days, and Direct Action continues to make sure there's plenty to say. It's a very pretty engine running the show, with explosions, dynamic shadows and nifty lighting effects. The feel is similar to C&C Generals, mainly because of the modern setting.

Overall, Direct Action is a solid RTS title with a credible, solid plot, if you can bare the FMV sequences.

It might not permanently pull people away from C&C, but it will distract them long enough for them to enjoy it.

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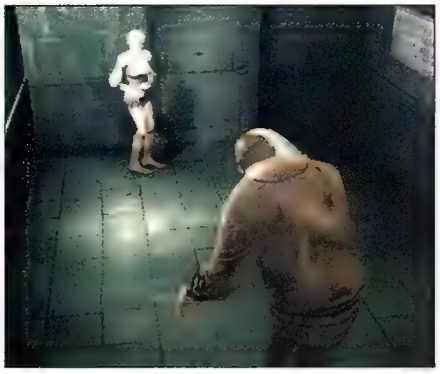
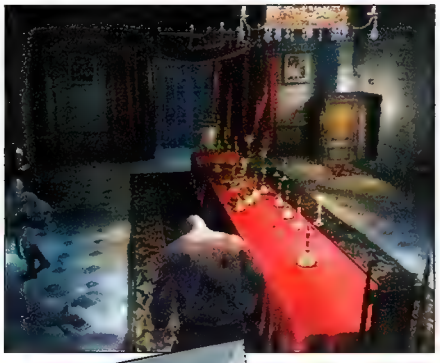




Haunting Ground

It's a dog eat dog world for **Logan Booker.**

Survival horror? Love it. It's one of the few genres that can effortlessly mix elements of action and adventure, usually bringing out the best in both. In fact, adding a new ingredient to the formula of this already damn near perfect creation, and making it work, would be a laudable achievement.

Yet, if anyone could give it a go, and do it right, it would be Capcom, father to the Resident Evil series. Cue Haunting Ground.

It's quite a departure from the expected. The main character, Fiona, isn't what you'd call a master of unlocking. Quite the opposite; your attractive 18-year old protagonist is completely at the mercy of her environment with her only means of attack being shoving, dodging and hiding. Struck with amnesia and lost in a sprawling castle, most of the game is spent uncovering your past, avoiding the chateau's resident man beast and training a sprightly dog named Hewie.

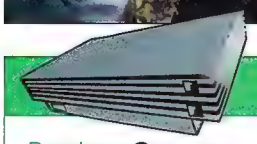
It is with Hewie that the core gameplay rests. Somehow, among the scares and shadows, Capcom has built in a basic Tamagotchi game mechanic.

Using the right analog stick, you can order, placate or discipline your furry compatriot. The orders change depending on your situation. In combat for instance, you can direct Hewie to attack or back down. Depending on how well you treat Hewie, he'll be more or less responsive to your commands.

Sadly, this mechanic proves to be annoying. While the unreliable nature of Hewie's relationship with the player can make for some tense moments, those moments quickly evolve into ones of frustration. It's never clear if your order wasn't heard or if it was ignored, making it hard to know when you should discipline Hewie or simply move closer to him. Although the game never gets as hairy as something like RE, the uncontrollable element introduced with Hewie detracts from the game as much as it adds. The little guy also has a habit of getting lost, which is fun, in the same way that glassing yourself with the shattered remains of your TV screen is fun.

An awesome improvement is the use of special effects to reflect Fiona's state of mind. In an early part of the game there is blood smeared on a pillar. On seeing this, the controller vibrates and the screen blurs and starts to 'pulse'. It's interesting how this small addition improves the intensity of the game, and it is in this effect that most of the tension is developed. Otherwise, many of the scares are ineffectual and won't bother the reasonably courageous.

Haunting Ground is a noble attempt to evolve the genre, but it won't satisfy the needs of the die-hard survival horror fan. It would serve as a good introduction to the genre for the less stalwart gamer.



PS2

Developer **Capcom**
Website **www.capcom.com**

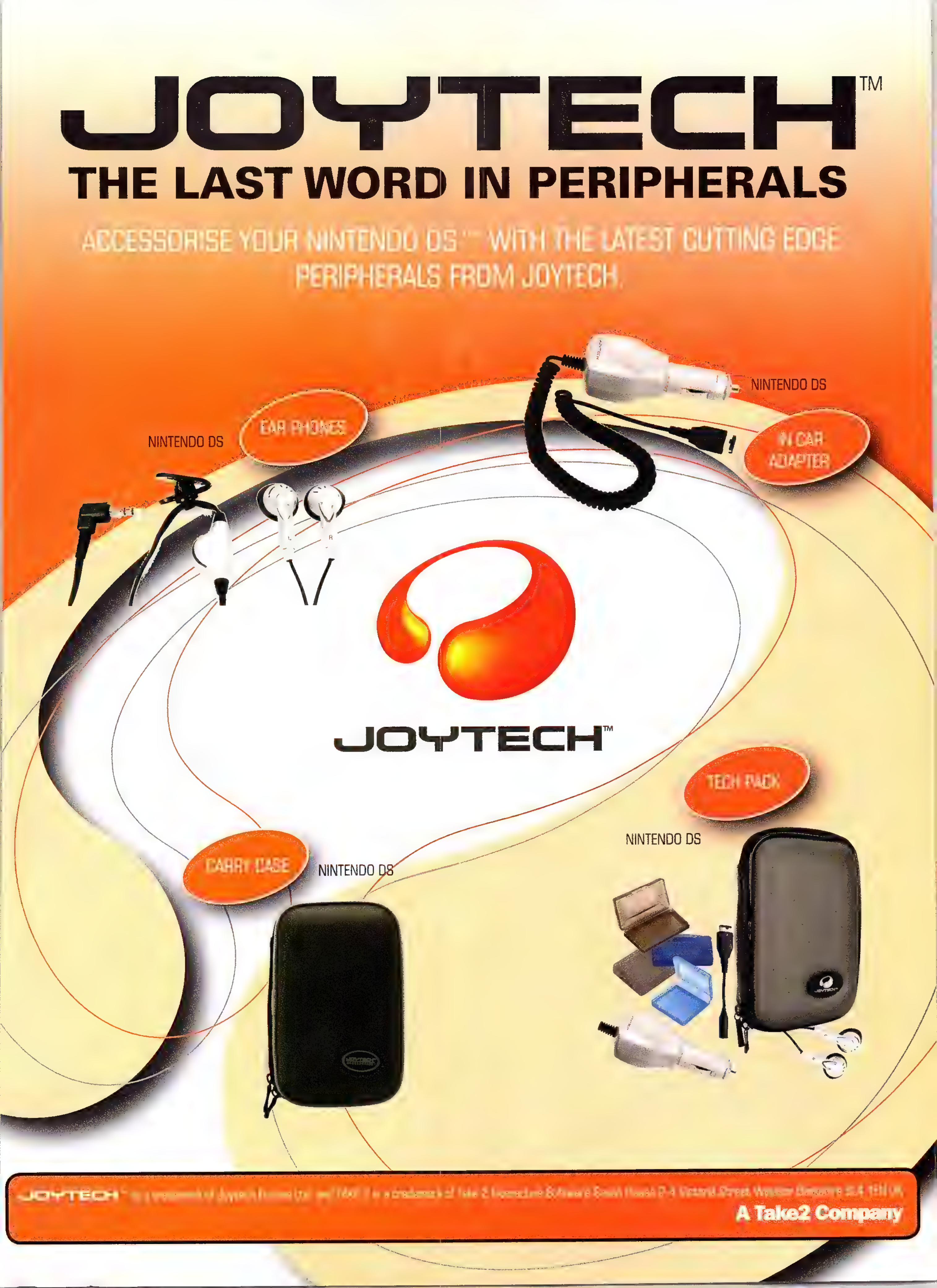
Players **1**
Other platforms **None**

VERDICT

Great use of special effects; interesting Hewie gameplay mechanic, refreshing.

Not scary; cumbersome Hewie gameplay mechanic; very slow to play.

score **7.0** out of 10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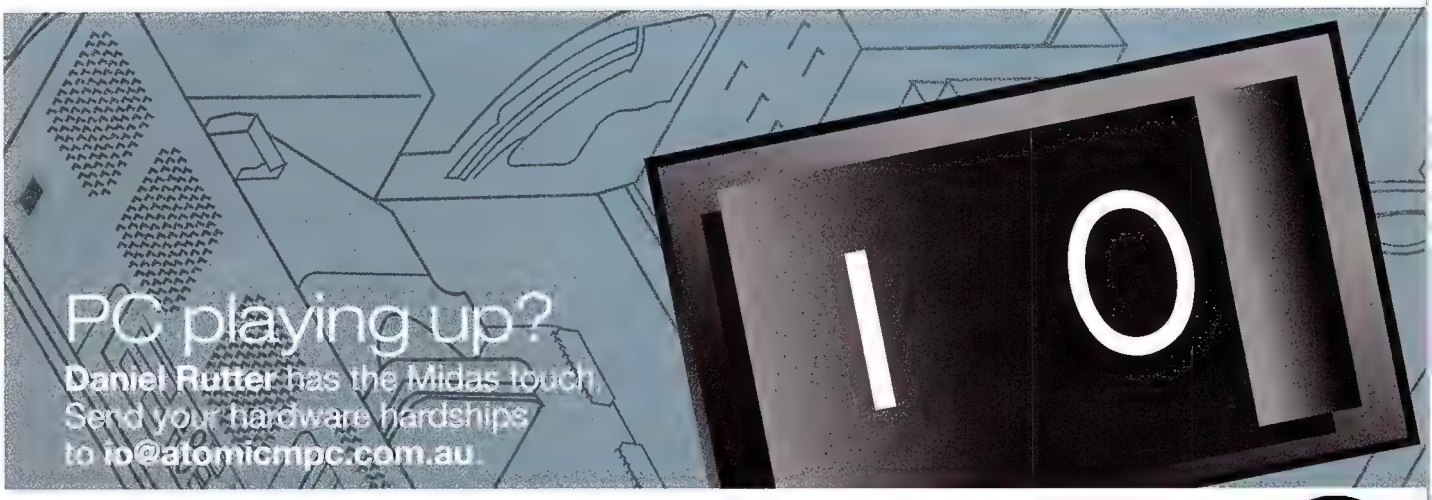


PC playing up?

Daniel Rutter has the Midas touch. Send your hardware hardships to **io@atomicmpc.com.au**.

Actually, it's 'cos they don't bribe us

Why is it that when I think games I think NVIDIA or ATI, but no one mentions 3Dlabs video cards? I would like to know how one of 3Dlabs' cards stands up against NVIDIA and ATI for games, and I also wonder why it doesn't try to break into the gaming industry?

Sean D

How do they stack up? Very, very badly indeed. 3Dlabs' single-core AGP Wildcat Realizm 200 manages less than 10 percent of GeForce 6800 Ultra's performance for high-res Doom 3, though it approaches 20 percent of the 6800's speed for high-res HL2.

The twin-core PCI-E Realizm 800 will do better, but not even twice as well – and it costs a couple of thousand US dollars. For pro-3D rendering, the 3Dlabs cards generally streak past all consumer boards of similar vintage, and often beat NVIDIA's more expensive Quadro cards handily as well; the Realizm 800 is a monster for 3ds max and various more esoteric software.

But not games. Actually, it's only been relatively recently that you could count on a 3Dlabs card to run most games at all. Reference: **http://tinyurl.com/6ugfk**

The mighty Wildcat Realizm 800. Known to gamers as the sucky Wildcat Realizm 800.

There's always chisels

I need to build an office computer really cheap, and have settled on an ASUS Terminator C3 barebones system as the base for it. But the Terminator only has an 800MHz C3, which is gonna be a big fat bottleneck. I have a Socket 370 PIII 933MHz that's still in a half-cannibalised Dell from four years ago. I could theoretically put that in the ASUS box.

Do you think there's a decent chance of the motherboard picking up the PIII without any hitches?

Joe

I don't think anyone's ever actually likely to get to the point of being able to answer that question, because I don't think the Terminator has a CPU socket.

Integrated-chip boards like that one, and like VIA's own M-series mini-ITX boards, typically have the CPU soldered in place, because it's cheaper that way (and because they may use CPUs that don't even come in a standard socketed form). I haven't seen one of the Terminators in person, but the pics on ASUS' page for it and in the downloadable manual (**http://tinyurl.com/5ruvq**) don't make it look socketed to me.

Laptop loogies

I know you can clean regular keyboards with water and mild detergent (I do it to mine all the time), but I was wondering if you know if you can do the same to laptop keyboards?

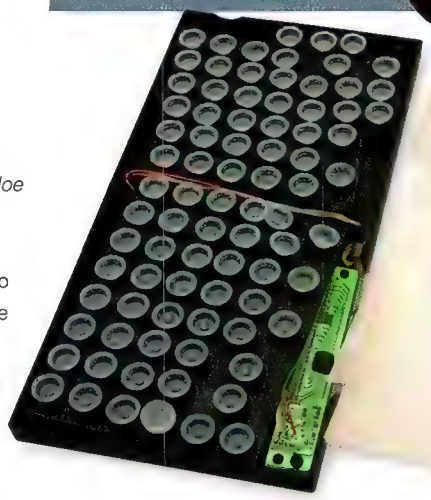
I've just had a guy drop a laptop off that has had beer spilled into the keyboard tray, luckily it doesn't look like it got anywhere else. But the keys are really sticky now.

Any ideas?

Cameron

IOOTM wins a Logitech MX510!

Magnify the heat from the sun by a billion and it still wouldn't be as hot as this mouse.



The best thing about cleaning keyboards is how many bits there are to lose.

As far as I know, you should be fine cleaning a laptop 'board this way. But doing it while the 'board is still part of the laptop is, for the benefit of our slower readers, a *Bad Idea*.

Stripping the keyboard out of a laptop is seldom easy, but it's usually only a medium-difficulty job, especially if the manufacturer provides a handy-dandy dismantle-and-reassemble guide – IBM are good that way, but I don't know about other manufacturers (you probably know better than me, if you're doing this sort of thing for a job).

The keyboard's a surface component, so you shouldn't have to shift too many Swiss-watch assemblies before you can free its ribbon cable

Soon, TARDIS technology will allow PSUs to contain fans that're bigger than the casing.

and lift it out, but there is of course ample room for disaster for operators who're less than perfectly coordinated.

Once it's out, I suggest you swamp the thing with clean water (tapwater is fine, a cheap spray bottle may help, de-ionised water can be used if you're paranoid), then leave it in a warm, well-ventilated place (out in the sun will do) to dry, for considerably longer than you think it will need.

Stripping the keyboard completely will help it dry if it's the usual kind with a layered contact assembly – top contacts, holey separator sheet, bottom contacts.

You can speed the drying process if you spritz the wet keyboard with meths (diluting and displacing the water with faster-evaporating ethanol). Meths shouldn't eat any components or coatings, and it's dirt cheap. (Usual disclaimers apply if this advice turns out to cause *Abrupt Keyboard Death Syndrome*.)

Or, try earplugs

I'm a silent PC enthusiast and have managed to passively cool every component in my system except one, the power supply.

I've looked at fanless power supplies (like the Antec Phantom) but from the research I've done they all have failure rates of at least 50 percent after six (or so) months of use.

Several companies make interface boards and external power bricks to supply power to mini-ITX boards, and I just happen to have a whole whack of Toshiba 15V@5A power bricks at home (you know where this is going). Is there any way to hook them up together to provide the 250-300 watts I'm looking for for my desktop system?

Dean

I'm not sure about the silent PSU failure rate you mention, but it wouldn't astonish me if at least some fanless PSUs had this problem. Mind you, some people no doubt install them in cases with very little ventilation, when they're designed to at least get a reasonable convection breeze.

My first suggestion would be to check out 'silent' PSUs with big 120mm temperature-controlled fans, of which there are quite a few on the market these days. They're not really silent, of course, but when the fans are at minimum speed they really are very quiet (and when the fan's running faster, there's probably a good reason).

My next suggestion would be to use a fanless PSU, but make sure it gets good ventilation – install it outside the case, if necessary, propped up on feet that let plenty of air circulate around it.

And then there's water cooling, of course, but water-cooled PSUs are something of an advanced project, for reasons you can probably figure out for yourself. And water rigs still need a fan on the radiator, unless the radiator's quite enormous.

Your pile of Toshiba bricks will, I think, have to wait for another project. You could probably run them in parallel and rig some awful arrangement of regulators to give you normal PSU rails, but you'd waste an awesome amount of power as heat. All such homebuilt systems are, unless you're a pretty expert electronics hacker, going to be some kind of linear PSU, whose efficiency will be lousy and which will need, for the most elegant version, some monstrous transformers to deliver the current a PC needs. You could make one that didn't need a fan, but the transformer hum might drive you nuts anyway.

Stick with pre-built solutions to preserve your sanity.

I/O OF THE MONTH

At least it's consistent

I've had my P4 for about 14 months and until about 8 months ago, it was running sweet. Now all I get is a whole lot of spontaneous restarts when I play intensive games like UT2004, Doom 3, NFS Underground 2 and so on. I have tried three different power supplies, changing the RAM from dual-channel to single, disabling HyperThreading and recently formatting and reinstalling XP. I have spoken to numerous PC technicians both from TAFE and various computer stores and no one can give me a straight answer.

Andrew Stewart

In years past, you would have been talking about your computer mysteriously hanging, rather than rebooting. The auto-restart is what XP does by default when, if it were an earlier Windows flavour, it would have bluescreened.

This is generally a good thing; if nothing else, it means flaky Windows servers restart themselves instead of making some admin poke the reset button when they finally notice the problem. On most desktop systems it just saves time, since bluescreen data is seldom helpful, even if you're one of the 1337 few who can understand it.

Repeated Blue Screens Of Death can indicate hardware or software problems, but in your case you'll find it's probably a hardware issue.

Heat's the first possible culprit, of course; dried-up thermal paste between the CPU and its heat sink, bung fan bearings, carpets of dust and so on can cause the symptoms you report. Try my usual testing method – take the case off and point a desk fan into the works, and see if the machine starts behaving itself. If it does, start hunting for heat.

If it's not heat, then it could be static damage to the motherboard or video card (probably not any other component). Static zaps much too small for you to feel are enough to damage chips, and such damage certainly can make the chip flaky, rather than kill it outright. If you leave the computer plugged in and obsessively touch chassis metalwork all the time while working on it, or use an anti-static wrist strap, then you'll probably avoid this problem – but most people (including some people who work in computer shops) just roll the dice, and usually get away with it.

Anyway, try to get hold of a loaner video card from somewhere, swap it in (taking proper anti-static precautions!) and see if the problem goes away. If so, then it's RIP for your old video card. If not, then it's depressingly likely to be a whole-new-motherboard situation.

WIN! $1995 Combustion 3!

'I was wondering one day what data travelling through a CPU would look like from the perspective of a lowly 1 or 0. So I experimented a little and I came up with this.' – *James*

Create the winning Artomic and win the latest version of Combustion, valued at **$1995**, from **discreet**!
Email a preview (no larger than 5MB) of your masterpiece to:

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hot

The best reader-submitted custom made boxes every month

Welcome to Hotbox! Each month we'll feature the winning Hotbox of the Month as voted for online at **www.atomicmpc.com.au/hotbox.asp**.

Not only do the winners get to show off their box in full glory for all to see on this page, but they also win an nForce3 based deluxe motherboard courtesy of Biostar!

Travis' Cool Cube

The idea of this baby came after looking at all those cases with multitudes of fans added for extra airflow and thinking how I should make the ultimate cooled case, and that's how the Cool Cube started.

A total of 18 fans were used to make this box, with none on the base and two missing at the back for the motherboard connection panel. The board is an EPIA M, which doesn't exactly require any extreme cooling, but was used as it was the perfect size for my project.

I used aluminium to hold everything together and to give it that industrial look. A Rheobus was used to slow down the fans whenever the noise started to get to loud. And to rice things up four mini cold cathodes where installed to give a whole 360 degrees of light.

Travis

technicaldetails

- 658.8cfm of air being pumped around
- Total of 200+ screws
- VIA EPIA M motherboard
- Onboard video
- Onboard CPU
- Onboard sound (noticing a trend?)
- 20GB laptop HDD
- Stealthed laptop DVD drive
- Four mini cold cathodes

Fame, fortune, and free stuff can be yours! Send your Hotbox to hotbox@atomicmpc.com.au and include the following:

- 3-4 high resolution, well lit, pictures
- A 250 word description of how you made it, the obstacles you overcame, the tools you used, and your inspiration.
- A detailed list of the machine's specs.

A win is as a win does

You can only enter once per competition or you'll be disqualified. You must provide a postal address and phone number for prize delivery when you enter (not a PO Box).

5x copies of Jade Empire for Xbox

Not everybody was Kung Fu fighting when they should have been. Totally unacceptable if you ask us. If you can't do a backward flip kick without the assistance of an automated flip kicker (read: your kid brother) then you really shouldn't be practising the art of the flip kick anyway. The other option is to do it virtually, with Bioware's incredibly hot Jade Empire. It's full of Imperial cities, quests, fighting, and ladies. Thanks to Microsoft (**www.microsoft.com**) for giving us five to kick along.

Q **What is the name of the priest in *Journey to the West*?**

3x Laserpod and accessories + T-shirt and cap

Lasers. The magical dancing light of man. Well, that's why we like them anyway. Who could resist a man's dancing light?

Regardless of what you like to see dancing, lasers are definitely fun, and Laserpod has been nice enough to give us three of its lovely prize packs, each valued at $200, to give away. Included in these packs is an awesome Laserpod unit with accessories, as well as a Laserpod T-shirt and cap. If lasers make you go 'uh', then visit **www.laserpod.com.au** and get your beam on.

Q **Who invented the Laserpod?**

2x Western Digital Passport 80GB portable drives

There's nothing wrong with a man purse. Guys should feel comfortable carrying around bags to hold their wallet or GI Joe action figures, or even a portable hard drive. There's no safer place to keep your data trinkets than a chunky yet compact portable device, which you can then carry around. To help you keep a firm grasp of your trinkets, Western Digital (**www.wdc.com**) has been nice enough to provide two fantastic Passport 80GB portable drives to give away. Cheers!

Q **What purpose does the drive shaft in a car serve?**

Email entries to **win@atomicmpc.com.au** or post them to: Atomic, 52 Victoria St, McMahons Point, NSW 2060. Please send a separate entry for each competition. Please ensure the competition name is the subject of the email, or is displayed clearly on the front of the envelope. The closing date for entries is 15 June 2005. Winners will be announced in *Atomic 55*.

Atomic 51 winners: 2x Logitech MX-1000 laser cordless mouse Q. What chip does the MX-1000 use to deliver its highly accurate goodness? A. Agilent S2020. M. Hall, Budgeree, Vic. C. Young, Hamilton, NZ. 1x Williams F1 Wheel for PS2 Q. Who is the Australian driver new to the BMW-Williams team this year? A. Mark Webber. M. Tabone, Glenroy, Vic. 1x Ultimate Quiet Case Q. What's the Latin word for quiet? A. Quietus. S. Daly, Kiama Downs, NSW.

Trivial Geek Questions

Angus Kidman is shirting the issue

Welcome to Trivial Geek Questions, the advice column that lurks in the nooks and crannies that even a deep space probe wouldn't dare to explore. No matter how seemingly mundane your query, TGQ will willingly embrace and investigate it with an enthusiasm that would do a C-grade game show contestant proud. Submit your questions to **tgq@atomicmpc.com.au** or via the *Atomic* site.

Q: As a charity fund-raising initiative, I want to release a series of T-shirts featuring Linus and other open source luminaries. Would I need their permission to do so? And is it worth registering a trade mark for the T-shirts? I don't want to see cheap knock-offs popping up on Cafe Press-driven sites 20 seconds after I get started.

TGQ: While TGQ wouldn't like to set itself up as a complete expert on etiquette – no surprise to anyone who's ever seen us snorting our way through soup in an expensive restaurant – we would have thought that the answer to this question was pretty obvious.

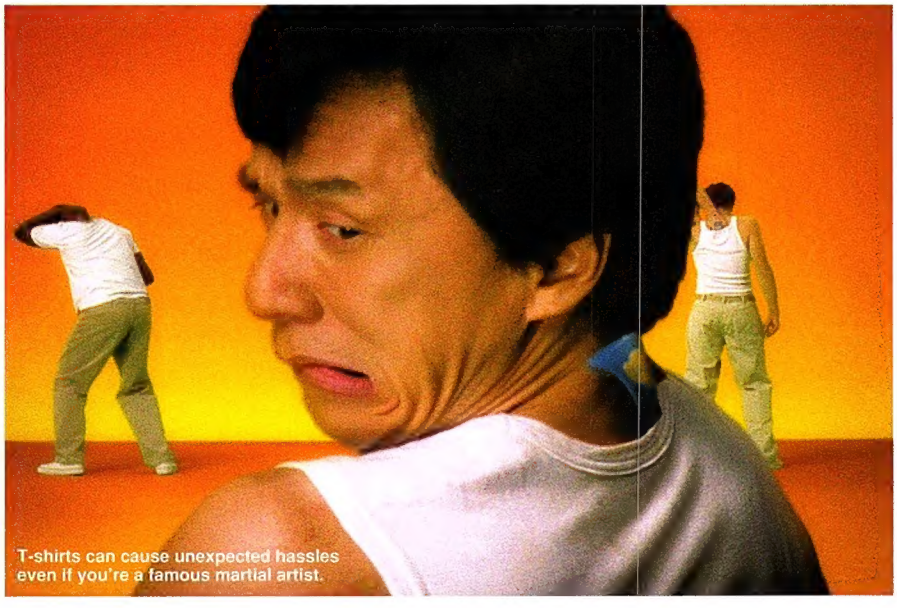
If you're going to feature a picture of Linus, Mad Dog or even Dannii Minogue on a T-shirt, then it would make sense and be a pleasing gesture to seek their permission (or at least send an email to them or their management letting them know of your plans). The fact that you're trying to raise money for charity isn't an excuse for dodging the issue.

The only arguable exception to this is if you're in politics, which seems to have created a vibrant and thrillingly nasty humorous T-shirt culture all of its own. Certainly no one seems to have bothered asking George W Bush's permission before whacking his kisser on a variety of garments, but getting to run the profitable half of the world does have other compensations.

By the way, we're making a somewhat charitable presumption of our own here: namely, that you also own the copyright in any images you plan to run on the T-shirt. If you're not planning on running a picture but just some fancy and suitably witty text, you'll be off the hook in a strict copyright sense – unless the individual in question happens to have registered their name as a trademark.

This in turn leads us to a rather unexpected discovery: there are a surprisingly large number of active trademarks in the US for the word 'Linus' when featured on T-shirts and other articles of clothing. One particularly comprehensive application covers the word when used on 'shirts, T-shirts, halter tops, crop tops, tank tops, sweat shirts, sweat pants, vests, under shirts, infant wear, baby bibs, aprons, scarves, bandanas, underwear, neckwear'. This is a grave blow to our plans to release Linus-themed bibs, unfortunately.

So our final suggestion? Ditch the T-shirts and do a lamington drive. No one's likely to copy you, or sue you, and even if it fails to raise much money, you'll still have something to eat.



T-shirts can cause unexpected hassles even if you're a famous martial artist.

atomican

www.atomicmpc.com.au

While some spent winter hibernating, Atomicans stepped up their cybernating. The hardcore overclocking contingent, led by Unixyk, took advantage of the cooler climate to wring more cycles out of their rigs in a SuperPi Challenge. At time of writing, Wwwww led the pack with a million iterations of pi in an astonishing 22 seconds. Not even the suicidal sacrifice of a fried Vapo could advance Supam beyond his second place time of a respectable 28 seconds.

Over in the Building and Troubleshooting Forum, Foods invited fellow geek gurus to a séance with his recently deceased hard drive. He almost gave up the ghost when Osama Bin Athlon's idea of cryogenically freezing the clicking corpse proved fruitless. But fortunately, Grommet80's suggestion – that a new controller circuit board would be more helpful than an Ouija Board – proved the right path to resurrection.

Meanwhile, in the Modding Forum, Nightbabe impressed even seasoned Dremelians with her maiden casemodding effort. Crediting her Invader ZIM-themed PC to the trinity of coffee, cigarettes and insomnia, she proved that even a n00b with an old AT case can create a truly *Atomic* artefact.

With double the bits on offer, Atomicans in the Tech Talk Forum were more than a bit excited about the imminent release of Windows XP x64. Like the quartermaster in *Starship Troopers*, Psynapse and his helpful list of drivers for the new operating system ensured Atomicans would be suitably armed for their upcoming battle against the bugs.

Would you like to know more? Enlist now at **www.atomicmpc.com.au**.

– Virt

potm

This month we've decided to give it to a bloke who has put a huge effort over the last year into a special sticky. Thanks Demonic!

Trusted Traders V4
www.atomicmpc.com.au/forums.asp?s=1&c=2&t=7195

This thread is the amazing ongoing backbone that holds Trademart together. The work and care put in is worth at least a shiny new Logitech MX510.

Fabulous darling

Maurice 'Moz' Ford says it's time for the metrosexuals to stand up.

Once, long ago, someone decided that if you wanted people to buy something then it had to have a cool name. And it's a decent enough theory. But just of late I've begun to wonder if the marketing gurus have been overdoing things a little. Have a look at any PC sales section and you'll be bombarded with macho names.

Don't believe me? I recently upgraded my PC. I won't bore you with specs – I don't need to. Not when I have a *Warhammer* processor, *Black Pirate* RAM, a *Zombie Death Killer* graphics card and a *Wolf Clan Samurai Warrior* HDD – all on a *Limited Edition Purple Ninja Space Monkey* mobo. Kick arse.

To reinforce the toughness of these components, the associated packaging is adorned with musclebound heroes, salivating monsters, fiery demons and scantily clad warrior princesses. (Strange that such warlike medieval entities would be endorsing completely unrelated electronic componentry. Still, look at what our cricketers put their names to.)

It's not like PC's really do anything to justify the names. Not like pool cleaners. Pool cleaners need tough names because they swim around looking like futuristic plastic Kraken, scaring small children and eating all the leaves, scum and rubbish that are foolish enough to cross their path.

But with computers – all this effort and bravado to toughen up something that... well... Just sits there. If we were invaded by space aliens, the last thing jumping to our defence would be our PC's. They'd probably dump their cache and BSOD at the first sign of static.

You see, contrary to popular belief, your PC can't be wielded like some legendary sword of valour. It's not imbued with special Ninja powers. It can't strike a pose that will send the opposite sex weak at the knees (but damn, wouldn't that rock? *-Ed*). It's just a hunk of plastic and silicone. (So is Michael Jackson. Coincidence? You be the judge.)

But apparently, no one has told the marketing moguls. One has to wonder what goes on in their mind. Is this just chance? A normal phase that marketers go through in their lives? Or has the spin doctoring community decided that we are all weedy nerds with no chance of scoring and we'll grasp any opportunity to feel like Arnold Schwarzenegger at his buffiest?

Sure, testosterone induced posturing can be just the ticket for beefing up a less than tough product. "Dancing with the Stars" needed just that and they ended up with Nikki Webster. Go figure.

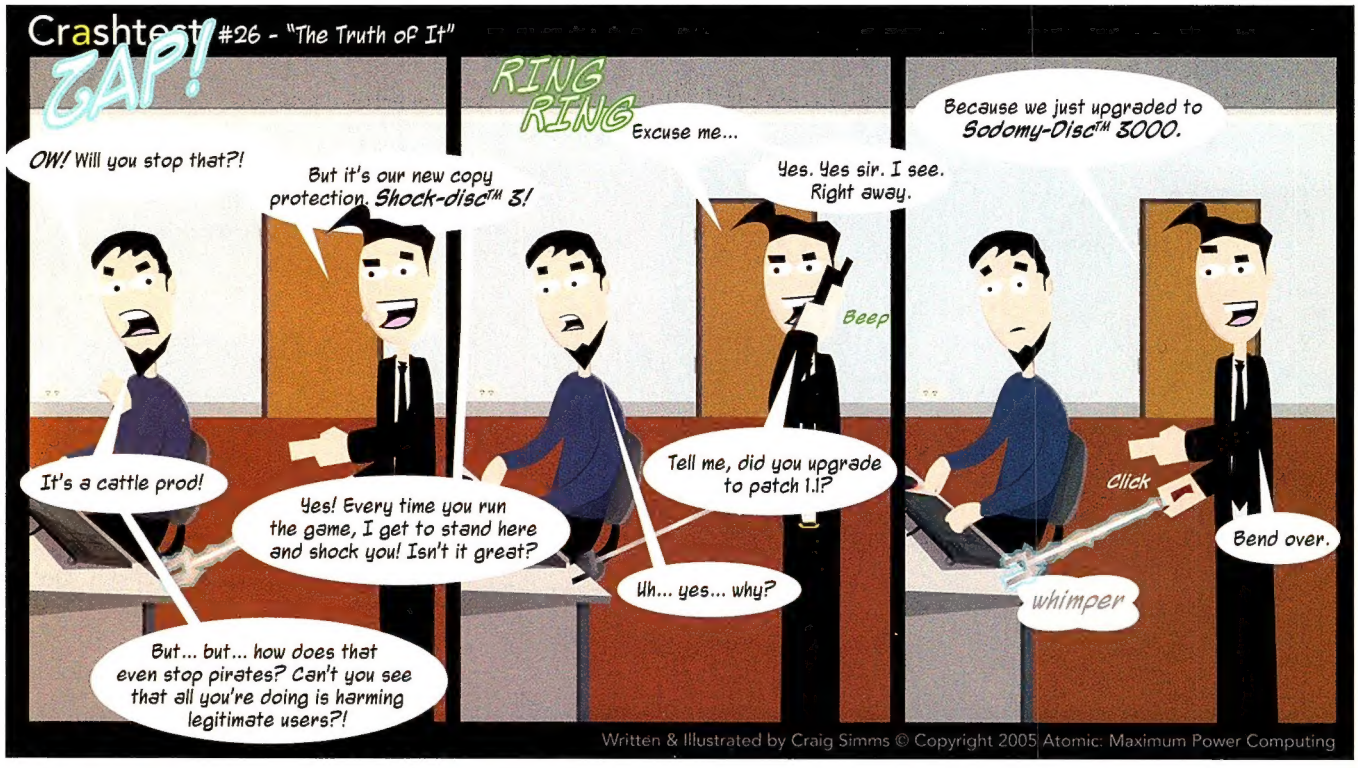
Frankly I'm over it. The industry needs a shake up. It needs to wake up and smell the Jolt Cola. Tough is so yesterday. In this new world of Metrosexuality, there is no place for warriors.

What we need is a reality TV show where five techies with questionable hair cuts and unusual fashion sense go around busting into nerds houses and giving their PC's extreme makeovers. No more Beefcake rubbish. We'll have Fluffy Bunny CPU's, floral prints on our PCB's and the packaging will display ballerinas dancing "I'm a little teapot" instead of the omnipresent steroid enhanced axe murderers.

It'll be a metrosexual PC revolution. I can see it now – Pride marches in the street. Thousands of nerds rallying outside computer stores, burning old PC's and chanting wimpy slogans. No more of this fake macho posturing. That's right, we're wimpy geeks and we're damned proud of it.

Now if you'll excuse me, I'm off to play Doom III. I've got an assortment of monsters to maim before I make it to the next level.

Aww, yeah.



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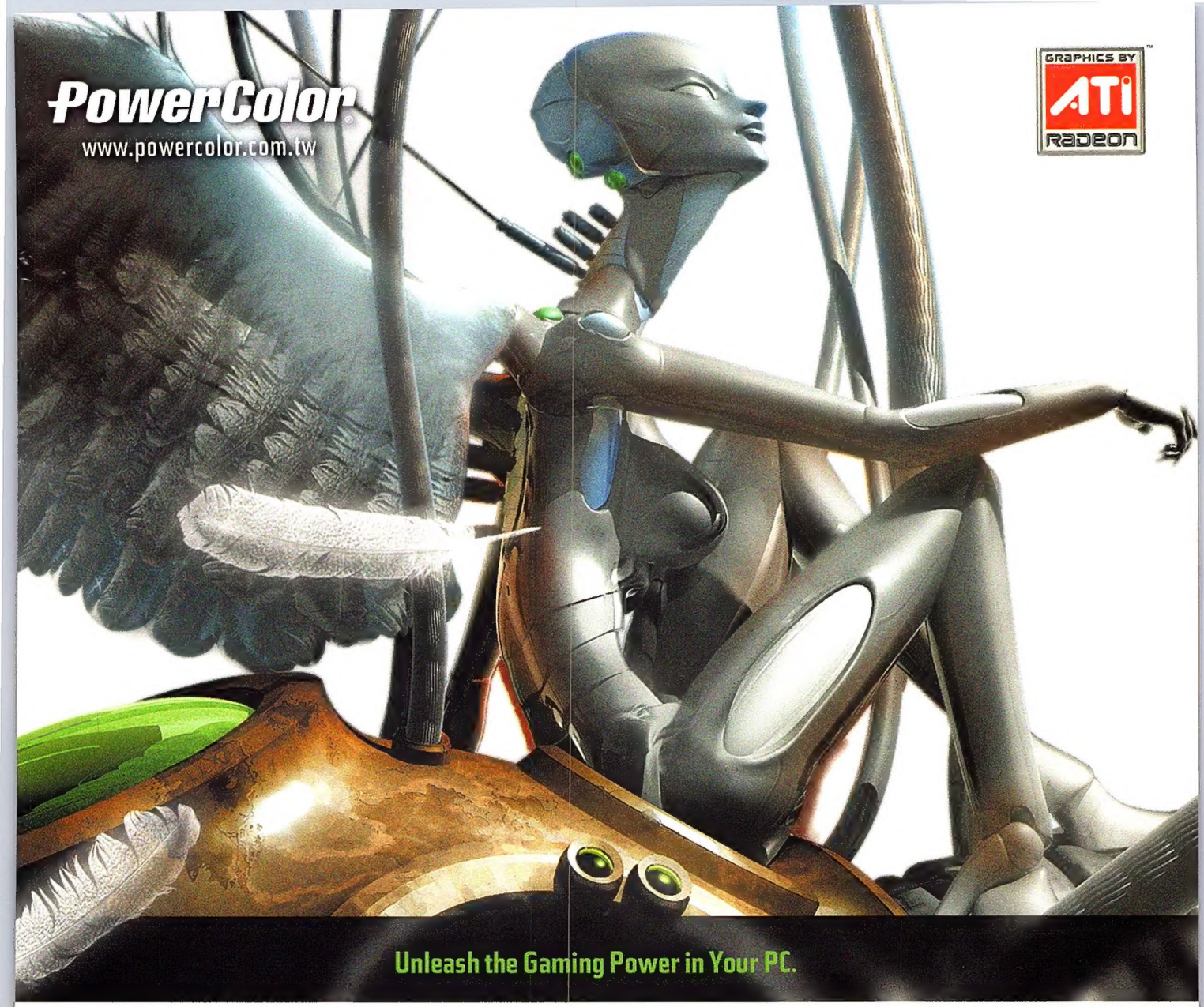

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